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THE NEW
INTERNATIONAL
ENCYCLOPÆDIA

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VOLUME II

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KEY TO PRONUNCIATION.

ā	as in	ale, fate. Also see ĕ, below.
ā̇	“ “	senate, chaotic. Also see ĕ, below.
â	“ “	glare, care.
ă	“ “	am, at.
ä	“ “	arm, father.
ȧ	“ “	ant, and final *a* in America, armada, etc. In rapid speech this vowel readily becomes more or less obscured and like the neutral vowel or a short u (ŭ).
a	“ “	final, regal, where it is of a neutral or obscure quality.
a	“ “	all, fall.
ē	“ “	eve.
ē̇	“ “	elate, evade.
ĕ	“ “	end, pet. The characters *ĕ*, *ā*, and *ā̇* are used for *ä* in German, as in Gärtner, Gräfe, Hähnel, to the values of which they are the nearest English vowel sounds. The sound of Swedish *ä* is also indicated by *ĕ*.
ẽ	“ “	fern, her, and as *i* in sir. Also for ö, *oe*, in German, as in Göthe, Goethe, Ortel, Oertel, and for *eu* and *oeu* in French, as in Neufchâtel, Crèvecœur; to which it is the nearest English vowel sound.
e	“ “	agency, judgment, where it is of a neutral or obscure quality.
ī	“ “	ice, quiet.
ī̇	“ “	quiescent.
ĭ	“ “	ill, fit.
ō	“ “	old, sober.
ō̇	“ “	obey, sobriety.
ô	“ “	orb, nor.
ŏ	“ “	odd, forest, not.
o	“ “	atom, carol, where it has a neutral or obscure quality.
oi	“ “	oil, boil, and for *eu* in German, as in Feuerbach.
o͞o	“ “	food, fool, and as *u* in rude, rule.
ou	“ “	house, mouse.
ū	“ “	use, mule.
ū̇	“ “	unite.
ŭ	“ “	cut, but.
ụ	“ “	full, put, or as *oo* in foot, book. Also for *ü* in German, as in München, Müller, and *u* in French, as in Buchez, Budé; to which it is the nearest English vowel sound.
û	“ “	urn, burn.
y	“ “	yet, yield.
B	“ “	the Spanish Habana, Cordoba, where it is like a *v* made with the lips alone, instead of with the teeth and lips.
ch	“ “	chair, cheese.
D	as in	the Spanish Almodovar, pulgada, where it is nearly like *th* in English then, this.
g	“ “	go, get.
G	“ “	the German Landtag, and *ch* in Feuerbach, buch; where it is a guttural sound made with the back part of the tongue raised toward the soft palate, as in the sound made in clearing the throat.
H	as	*j* in the Spanish Jijona, *g* in the Spanish gila; where it is a fricative somewhat resembling the sound of *h* in English hue or *y* in yet, but stronger.
hw	“	*wh* in which.
K	“	*ch* in the German ich, Albrecht, and *g* in the German Arensberg, Mecklenburg; where it is a fricative sound made between the tongue and the hard palate toward which the tongue is raised. It resembles the sound of *h* in hue, or *y* in yet; or the sound made by beginning to pronounce a *k*, but not completing the stoppage of the breath. The character K is also used to indicate the rough aspirates or fricatives of some of the Oriental languages, as of kh in the word Khan.
n̲	as in	sinker, longer.
ng	“ “	sing, long.
N	“ “	the French bon, Bourbon, and *m* in the French Etampes; where it is equivalent to a nasalizing of the preceding vowel. This effect is approximately produced by attempting to pronounce ‘onion’ without touching the tip of the tongue to the roof of the mouth. The corresponding nasal of Portuguese is also indicated by N, as in the case of São Antão.
sh	“ “	shine, shut.
th	“ “	thrust, thin.
TH	“ “	then, this.
zh	as	*z* in azure, and *s* in pleasure.

An apostrophe [’] is sometimes used to denote a glide or neutral connecting vowel, as in tā′b’l (table), kăz′’m (chasm).

Otherwise than as noted above, the letters used in the respellings for pronunciation are to receive their ordinary English sounds.

When the pronunciation is sufficiently shown by indicating the accented syllables, this is done without respelling; as in the case of very common English words, and words which are so spelled as to insure their correct pronunciation if they are correctly accented. See the article on PRONUNCIATION.

A PARTIAL LIST OF THE LEADING ARTICLES IN VOLUME II.

ARISTOTLE.
Professor Clifford Herschel Moore.

ARMIES.
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ARMOR PLATE.
Lieutenant-Commander Lewis Sayre Van Duzer.

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ART.
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Captain James A. Shipton, Captain Leroy S. Lyon.

ARYAN.
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Mr. Henry Gannett, Dr. W J McGee, Professor Edwin A. Start, and others.

ASPHALT.
Professor Heinrich Ries, Mr. Moses Nelson Baker.

ASSAYING.
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ASSOCIATION OF IDEAS.
Professor Edward Bradford Titchener.

ASSYRIAN ART.
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Professor George W. Kirchwey.

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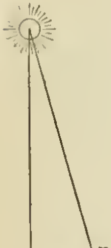
Professor George W. Kirchwey.

BERKELEY.
Professor Evander Bradley McGilvary.

BERTILLON SYSTEM.
Dr. Alvin Sydney Johnson.

THE NEW INTERNATIONAL ENCYCLOPÆDIA

ARIS'TAR'CHUS (Gk. 'Αρίσταρχος, *Aristarchos*) of SAMOS. A celebrated ancient astronomer of the Alexandrian School, who made his observations about B.C. 280-264. All his writings have perished, excepting a short essay on the sizes and distances of the sun and the moon. In this he shows the method of estimating the relative distances of the sun and moon from the earth, from the angle formed by the two bodies at the observer's eye when the moon's phase reaches exactly the first or third quarter; i.e., when we see a half moon. Remembering that the moon's light is simply reflected solar light, it is easy to see from the annexed figure that the three bodies must then form a right-angled triangle, with the moon at the right angle. The angle MES being then observed, we can readily calculate the ratio EM to ES. This is quite correct in theory; but the impossibility of determining when the moon is exactly half illuminated renders the method inaccurate in practice. Besides, in the days of Aristarchus there were no instruments for measuring angles with anything like accuracy. Aristarchus estimated the angle at E at 83° and determined EM to be one-twentieth of ES, the truth being that the angle at E differs only by a fraction of a minute from a right angle, and that EM, the distance of the moon from the earth, is about 1/400 of ES, the distance of the sun. According to some accounts, Aristarchus held, with the Pythagorean School, that the earth moves around the sun. Vitruvius speaks of Aristarchus as the inventor of a kind of concave sun-dial. His essay was first published in Latin (Venice, 1498), then in Greek (Oxford, 1688), and it has since been republished.



ARISTARCHUS OF SAMOTHRACE (B.C. 216-144). A Greek scholar. He was the pupil of Aristophanes of Byzantium, became tutor to the son of Ptolemy Philometor, and succeeded his master as head of the Alexandrian Library. He died in Cyprus at the age of 72. Aristarchus represents the highest attainments of philological criticism in antiquity, and his influence dominated all later workers. He gave his attention chiefly to exegesis of the poets, particularly of the Homeric poems; his recension is the basis of our common text of Homer to-day. He wrote an enormous number of exegetical works—according to Suidas over 800—and many special treatises besides. Fragments of his comments are preserved, e.g., in the Venetian scholia to the *Iliad*. He founded a school of *Aristarcheans* at Alexandria, which continued to work on classical texts until after the beginning of the Empire. For an account of Aristarchus's Homeric studies, consult Lehrs, *De Aristarchi Studiis Homericis* (Königsberg, 1882).

ARISTE, à'rēst'. A male character in Molière's *Les femmes savantes*, the common-sense brother of Chrysale. He befriends the lovers, and, through his pardonable falsehood concerning Chrysale's financial loss, exposes the knavery of Trissotin.

ARIS'TEAS (Gk. 'Αριστέας). An officer at the court of Ptolemy Philadelphus. He is said to have been sent by the latter to Jerusalem (B.C. 273), where he obtained from the high-priest Eleazar a genuine copy of the Pentateuch and a body of seventy-two elders who could translate it into Greek. See Hody, *De Bibliorum Textu Originali* (Oxford, 1705); Dale, *Dissertatio super Aristea* (Amsterdam, 1705). See BIBLE.

ARISTEAS. A magician of antiquity who rose after his death, and whose soul left and reëntered his body according to its pleasure. His earliest appearance is as the teacher of Homer. We also hear of him as having been born, at a period later than Homer, at Proconnesus, an island in the Propontis. He is said to have traveled through the countries north and east of the Euxine, and to have visited the Arimaspi, the Cimmerii, the Hyperborei, and other mythical nations, and after his return and subsequent disappearance to have written an epic poem in three books, called *Arimaspia*, a composition belonging probably to the Sixth Century B.C. Aristeas is fabled to have entered a fuller's shop at Proconnesus and there died. Later a traveler appeared who said that he had met him on the road between Cyzicus and Artace. When the fuller's shop was entered no body was found. It was seven years after this strange disappearance that he reappeared at Proconnesus and wrote the *Arimaspia*. He then vanished once more, to reappear for the second time 240 years later at Metapontum, in Italy. He advised the people of Metapontum to build an altar to Apollo, and by its side a statue of himself, saying that he had been present, in the form of a raven, when the god founded the city. Later accounts tell other wonderful stories of Aristeas.

AR'ISTI'DES (Gk. *'Αριστείδης, Aristeidēs*), called THE JUST (c.550-467 B.C.). An Athenian statesman. He was the son of Lysimachus, descended from one of the best families in Athens. His birth is to be placed shortly after the middle of the Sixth Century B.C. At the battle of Marathon (B.C. 490) he was one of the ten Athenian generals who held command successively, each for a single day. In the following year he was chief archon. His policy in State politics was opposed to that of the other great statesman of his time, Themistocles, and the rivalry between these two became so pronounced that the Athenians, in order to obtain quiet, finally resorted to the means of ostracism. Aristides received the necessary vote for banishment, and retired to Ægina, Athens's bitter enemy. The date of this ostracism was apparently B.C. 484. The story is told that on the day of voting, an ignorant citizen, personally unknown to the statesman, being asked why he voted against Aristides, answered: "Because he was tired of hearing him always called *The Just*." Four years later, when Xerxes invaded Greece, a general amnesty for all exiles was declared by Athens, and in consequence thereof Aristides joined the Athenian fleet at Salamis and took a prominent part in the battle that followed. Being thus restored to favor, he was appointed commander of the Athenian troops that fought at Platæa, in B.C. 479. In B.C. 477 he was joint commander with Cimon of the Athenian contingent in the combined Greek fleet which was engaged in driving the Persians from the Greek cities on the coast of the Ægean Sea. After the fall of Pausanias, he took the chief part in organizing the Delian League. It is said that after the battle of Platæa he carried through a law opening the archonship to the whole body of Athenian citizens. He died poor, in B.C. 467, leaving a son and two daughters. His body was carried to Athens and buried at Phalerum, at the cost of the State.

ARISTIDES, ÆLIUS (129-189). A Greek rhetorician, surnamed Theodorus, son of Eudemon, a priest of Zeus. He enjoyed the teaching of the most famous rhetoricians of his day, Aristocles in Pergamus and Herodes Atticus in Athens; in grammar and literature he was trained by Alexander of Cotyæum, whom he honored with a eulogy still extant. He traveled extensively in Egypt, Asia, Greece, and Italy, exhibiting his art as a speaker. While in Rome in 156 he was attacked by a severe illness, which troubled him seventeen years with slight interruptions; yet he seems to have continued his vocation in spite of it. He stood in such favor with the Emperor Marcus Aurelius that he secured the rebuilding of Smyrna at the imperial expense after its destruction by an earthquake in 178. Of his works, we have two rhetorical treatises and 55 speeches. Of these some are eulogies on deities and cities (e.g. Rome and Smyrna), others declamations like his *Panathenaicus*, modeled on Isocrates' oration with the same title. Interesting also are the six *Sacred Speeches* (*ἱεροὶ λόγοι*), which report the suggestions made by Æsculapius through his priests for the rhetorician's recovery. Edited by Dindorf (3 vols., Leipzig, 1829).

ARISTIDES OF THEBES. A Greek painter of the time of Apelles. He lived about the middle of the Fourth Century B.C., and was a son and pupil of Nicomachus. He was noted for power of expression in his work, one of his finest pictures being that of a babe approaching the breast of its mother, who is mortally wounded, and whose face shows her fear lest the child should find blood instead of milk. His works were bought at enormous prices, and one of them was the first foreign painting ever exhibited to the public in Rome. He left two sons, Nicerus and Ariston, to whom he taught his art.

ARISTIDES QUINTILIANUS (Gk. *'Αριστείδης Κοϊντιλιανός, Aristeides Koïntilianos*). A Greek grammarian of about the First Century A.D., and author of a treatise on music which is one of the most valuable of all ancient discussions of that subject. In the first part it treats of the principles of harmonics and rhythm, as laid down by Aristoxenus, but later introduces the Neo-Platonic ideas of the moral effects of music and the connection between musical intervals and the harmony of the universe. It was originally edited by Meibomius, and in 1882 by Jahn. Consult Cäsar, *Die Grundzüge der griechischen Rythmik im Anschluss an Aristeides* (Marburg, 1861).

ARISTIDES, SAINT. A Greek Christian apologist, of the First Century, who also taught rhetoric and philosophy. He presented to the Emperor Hadrian an apology for the Christian faith, which was highly esteemed by the early Church. This work is lost, with the exception of a fragment discovered and published at Venice in 1878. His day is August 31.

AR'ISTIP'PUS (Gk. *'Αρίστιππος, Aristippos*). The founder of the Cyrenaic or Hedonistic School of Philosophy. He was the son of Aristades of Cyrene, in Africa, and was born probably not long before B.C. 435. He was drawn to Athens by the fame of Socrates, whose pupil he remained until his master's condemnation and death, without, however, adopting fully his philosophy. After Socrates's death he lived in various cities, avoiding all hindering connections by becoming a citizen of no state, but having guest-friends in many. We know that he sojourned some time in Ægina, in Corinth, where he was intimate with the famous courtesan Laïs, and especially at the Syracusan court. He must have spent considerable time also in his native Cyrene, where he possessed property, for his philosophic school was there established. His master, Socrates, had taught that virtue and felicity together formed the highest aim of man; the latter Aristippus emphasized as a principle in itself, and declared that pleasure (*ἡδονή, hēdonē*) was the supreme good. According to him, our sensations alone are the real bases of knowledge, and all that gives pleasant sensations must be good; virtue and all so-called moral obligations and limitations have no validity so far as they limit pleasure. Yet Aristippus shows the influence of Socratic doctrine when he teaches that the wise man will wish to preserve the enjoyment he may secure by practicing self-control, judgment, and moderation; and for the same end will resist the mastery of the passions. Further, the greatest pleasure is to be found in the cultivation of the mind. For this teaching he has been not inaptly named a pseudo-Socratic.

Many anecdotes about Aristippus have come down from antiquity. They show him to have been a skillful man of the world, capable of adapting himself to the changes of fortune. Plato is reported to have said that Aristippus was the only man he knew who could wear with equal grace both fine clothes and rags. Diogenes Laërtius has preserved to us many of his *bon-mots* and repartees. He apparently did not formulate a philosophy himself; the Cyrenaic system was probably worked out by Arete, his daughter, and by her son, Aristippus the younger. (See HEDONISM.) Aristippus's works, if he left any, have been lost; the five letters to which his name is attached are unquestionably spurious. Consult: Zeller, *Geschichte der griechischen Philosophie* (Leipzig, 1893), and Ueberweg, *History of Philosophy*, English translation (New York, 1877).

ARISTO, ȧ-rēs′tō. Sganarelle's brother in Molière's *Ecole des maris*.

AR′ISTOBU′LUS (Gk. Ἀριστόβουλος, *Aristoboulos*). An Alexandrian Jew who lived under Ptolemy VI., Philometor, and was considered by the early fathers as founder of the Jewish philosophy in Alexandria. He was the author of certain works (B.C. 170-150) on the Pentateuch, of which only fragments are preserved in Clement of Alexandria and in Eusebius. It was intended to show that Greek philosophers and poets borrowed their views from the Pentateuch; and to support this theory, numerous questions were professedly taken from Linus, Hesiod, Homer, and Orpheus, of which the Christian apologists made abundant use. There is no reason to question the genuineness of the work of Aristobulus, which exhibits all the characteristics of the literature of Hellenistic Judaism. As for the supposed quotations from the Greek poets, it is probable that Aristobulus adopted them from some older work by a Jewish writer, who forged the verses in question. See Schürer, *History of the Jewish People in the Time of Christ*, Vol. II., 237-243.

ARISTOBULUS OF CASSANDRIA. A Greek historian, born in a city of Chalcidice, but afterwards—later than B.C. 316—a citizen of Cassandria. When eighty-four, he wrote an historical work of unknown title on Alexander the Great, whom he accompanied on his Asiatic campaigns. This work was freely used by later authors, noticeably by Arrian, Strabo, and Plutarch.

ARISTOBULUS I. A prince of Judæa, who succeeded his father, John Hyrcanus, as high-priest in B.C. 105. His mother had been given the royal office by the will of Hyrcanus, but the son deposed her, put her in prison, where she died of hunger, while he took the title of king, the first instance of its assumption among the Jews after the Babylonian captivity. Aristobulus had a decided leaning toward Hellenism, though, despite this fact, he remained Jewish in his feelings. He was disliked by the people for imprisoning his mother, and all his brothers except Antigonus, and even him, at a later period, he murdered at the instigation of Queen Salome. He conquered a large part of the Iturean country and compelled the inhabitants to accept Judaism. He died in B.C. 104 of a malignant disease, although his death may have been hastened because of remorse for the murder of his brother.

ARISTOBULUS II. (? -B.C. 49). Son of Alexander Jannæus (brother of Aristobulus I.) and Salome Alexandra (widow of Aristobulus I.), who succeeded in grasping the high-priestship and the royal authority from his elder brother, Hyrcanus II., to whom both belonged. Aristobulus maintained himself from B.C. 69 to B.C. 63, when Hyrcanus appealed to Pompey. After many intrigues and changes of front Pompey finally took sides against Aristobulus, and, after reducing the extent of the Jewish possessions, placed Hyrcanus in charge as high-priest, without the title of king. Aristobulus was taken as a prisoner of war to Rome. He was released by Cæsar, but was poisoned by adherents of Pompey, and died in B.C. 49.

AR′ISTOC′RACY (Gk. ἀριστοκρατία, *aristokratia*, from ἄριστος, *aristos*, best + κράτος, *kratos*, power). A form of government in which the sovereign power is vested in a small number of citizens, as opposed to monarchy, in which the supreme authority rests with one man, or to democracy, where the ultimate authority is exercised by the entire body of freemen. Etymologically, the term denotes the rule of the "best," used, however, in the sense of the Greek *aristos*, which connoted high birth and the possession of wealth, as well as personal excellence. In an aristocracy, however, though the power of government was wielded by a few, theoretically the administration of government was carried on for the welfare of the many. Whenever the interests of the commonwealth were made subservient to the interests of the rulers, aristocracy degenerated into *oligarchy*. To the Greek mind aristocracy appealed as the most acceptable form of government, in that it was free alike from the dangers of despotism and mob rule. Athens, before the period of the Persian Wars, and Sparta, practically during the entire course of its history, were aristocracies in fact, since in both places the chief power was exercised by senates which represented only the noblest and wealthiest families of the state. The same was true of Rome for at least two hundred and fifty years before the establishment of the Empire. As preeminence in rank became less closely associated with the ownership of land, there arose aristocracies of wealth as well as of birth, typified by ancient Carthage and modern Venice. In the Middle Ages there was no aristocracy, strictly speaking, for though political power reposed in the hands of a very small portion of the people, each feudal lord in his own domain was sole master. It was only with the rise of the modern state that an aristocracy again became possible. It appeared, however, in quite a different form from the ancient aristocracy, and partook rather of the nature of a privileged social class. Where the sovereign power was vested in the king, as was the theory of monarchical government in early modern times, aristocracy referred rather to a monopoly of titles and offices than of actual political power. Still, the rule of powerful families was not rare in the history of Europe, especially at times when weak kings occupied the throne, as was the case with the Guises of France and the rulers of the House of Valois. In England the government, from the accession of the house of Hanover down through the Eighteenth Century, though parliamentary in form, was in fact an aristocracy, since King and Parliament alike were under the control of a few great Whig families. At present, however, though the aristocratic element is still strong in Great Britain and Germany so far as the enjoyment of public office is concerned, the term aristocracy has become almost entirely social in meaning, and is used loosely and in a great variety of combinations to denote a select few—as aristocracy of birth, of wealth, or of brains.

AR′ISTOGI′TON. See HARMODIUS AND ARISTOGITON.

AR′ISTOL. A light-brown, amorphous powder formed by the union of iodine and thymol. It contains 45.8 per cent. of iodine, and chemically it is dithymol-diiodide. Insoluble in water and glycerin, it is freely soluble in ether and fatty oils, and slightly so in alcohol. Its action is similar to that of iodoform (q.v.), but it possesses the advantage of being odorless. Being an unstable compound, it cannot be mixed with substances which have a tendency to combine with iodine, and so is best used alone. It is used as a substitute for iodoform, as a cicatrizant and mild antiseptic, in dressing wounds.

ARISTOLOCHIA, á-rĭs′tô-lô-kī′á (Lat., from Gk. *ἀριστολόχεια*, *aristolocheia*, an herb promoting childbirth, like birth-wort, from *ἄριστος*, *aristos*, best + *λοχεία*, *locheia*, childbirth, childbed). A genus of plants of the natural order Aristolochiaceæ. This order consists of herbaceous plants or shrubs, often climbing shrubs, and contains upward of 180 known species, chiefly natives of warm climates, and particularly abundant in the tropical regions of South America. The species are mostly shrubby, some of them climbing to the summits of the loftiest trees. Several are found in the south of Europe; one only, the common birthwort (*Aristolochia clematitis*), occurs upon the Continent as far north as about latitude 50°, and is a doubtful native of England. It is a perennial plant, with erect, naked, striated stem, heart-shaped dark-green leaves on long stalks, the flowers stalked, and growing to the number of sometimes seven together, the tube of the perianth about one inch long, and of a greenish color. It grows chiefly in vineyards, hedges, about the borders of fields, among rubbish, and in waste places. It has a long branching root, with an unpleasant taste and smell, which, with the roots of *Aristolochia rotunda* and *Aristolochia longa*, two herbaceous species, natives of the south of Europe, was formerly much used in medicine, being regarded as of great service in cases of difficult parturition, whence the English name. These roots possess powerful stimulating properties, and those of the southern species are still used as emmenagogues. The root of *Aristolochia indica* is used in the same way by the Hindus. *Aristolochia serpentaria*, Virginian snakeroot, is a native of most parts of the United States, growing in woods. It has a flexuous stem, 8 to 15 inches high, bearing heart-shaped, very acute leaves. The flowers are on stalks, which rise from near the root; the orifice of the perianth is triangular. The root has a penetrating, resinous smell, and a pungent, bitter taste. It has long been a fancied remedy for the bite of the rattlesnake. It possesses stimulant, tonic, and diaphoretic properties. It forms an article of export from the United States to Europe, being highly esteemed as a medicine in certain kinds of fever. Its reputation as a cure for serpent bites is shared by other species, natives of the warmer parts of America. Several South American species seem also to possess medicinal properties analogous to those of the Virginian snakeroot. *Aristolochia sipho* or *Aristolochia macrophylla*, a climbing shrub of 15 to 20 feet in height, a native of the southern parts of the Alleghany Mountains, is frequently planted in the United States, in Great Britain, and on the Continent of Europe, to form shady bowers. It has very large round or somewhat heart-shaped leaves (a foot in breadth), of a beautiful green. The flowers hang singly, or in pairs, on long stalks; the tube of the perianth is crooked in its upper part, inflated at the base, and lined with reddish-brown veins, having a sort of resemblance to the bowl of a tobacco pipe, for which reason the shrub is sometimes called pipe-shrub, pipe-vine, or Dutchman's pipe. *Aristolochia tomentosa* resembles Aristolochia sipho, except in being smaller, very hairy, and in having yellow flowers. The tropical species are distinguished for their beauty and the peculiar forms of their flowers. Some of them are much-prized ornaments of our hot-houses, *Aristolochia grandiflora* (*Aristolochia gigas* of Lindley), the goose-flower or pelican-flower of the West Indies, being one of the most important. Its name is derived from the fancied resemblance to the bird. Fossil forms of Aristolochia have been described from the Tertiary rocks of Greenland, the Rhone Valley, and from Portugal, and still earlier forms, under the names *Aristolochites* and *Aristolochiæ phyllum*, from the Cretaceous of North America.

AR′ISTOM′ENES (Gk. Ἀριστομένης). A Messenian general who commanded the army of his country in the Second Messenian War, in the Seventh Century B.C. He upheld with success the Messenian cause for about seventeen years, but was finally defeated and went to Rhodes, where his son-in-law was one of the reigning princes. Many heroic deeds are related of Aristomenes.

ARIS′TON (Gk. Ἀρίστων), or **ARIS′TO** OF CHIOS (?-c.250 B.C.). A disciple of Zeno, and afterward, according to Diogenes Laërtius, of the Platonist Polemo. Though a professed Stoic, he differed from Zeno in that he rejected all branches of philosophy except ethics; maintained that the supreme good consisted in *ἀδιαφορία*, *adiaphoria*, or entire indifference to everything except virtue and vice; recognized only one virtue, which he called *ὑγεία*, *hygeia*, or health of soul, and doubted the existence of God. Ariston was called Siren, from his eloquence, and Phalantus, from his baldness.

AR′ISTOPH′ANES (Gk. Ἀριστοφάνης) (c.450-c.385 B.C.). The only writer of the old Greek comedy of whose plays any survives entire. He was the son of one Philippus, born possibly in the deme of Cydathene. As he also had property in the island Ægina, he was sometimes called an Æginetan. The most probable date of his birth is between B.C. 450 and 445. That his education was of the best is shown by his intimate knowledge of Æschylus, Stesichorus, and Pindar. His genius was of the highest order, so that he maintained himself for over a generation as more than peer among the brilliant writers of comedy of his day. In polities he favored, with all the force of his impetuous nature, the aristocratic peace party; and in his hands, comedy, which had been given a political turn by his older contemporary, Cratinus, became in the first period of the Peloponnesian War a most effective weapon against the demagogues and their faction. His sharp wit and biting humor on at least two occasions stirred Cleon to bring suits against him.

Aristophanes's literary activity covered forty years (B.C. 427-388), and his plays mirror the political and social changes of the State. We can distinguish three periods: the first ends with 421, the second with 405, and the third with 388. In all we have forty-four titles, of which four are considered spurious; from the forty genuine plays eleven are preserved, of which five belong to the first period. Aristophanes's earliest play was *The Banqueters*, produced in 427, a satire on the new-fangled teachings of the Sophists as compared with the simple education of the fathers. *The Babylonians* (426) contained a sharp attack on the demagogue Cleon. Both these plays are lost. *The Acharnians* (425) won the first prize. It is a satire on the headstrong Jingoes at Athens who are typified in the play by the captain, Lamachus. The blessings of peace are exhibited by the good fortune of an old countryman, Dicæopolis, who makes a private treaty with the Lacedæmonians for thirty years, and thereby enjoys all blessings, in contrast with Lamachus, who comes to grief with his campaigning. *The Knights* (424) also won the first prize. This is the first play which Aristophanes brought out in his own name, the three previous having been produced under the name of Callistratus. In this comedy Aristophanes fulfills the promise which he made, in *The Acharnians* the year before, to cut Cleon into pieces. The demagogue is here represented as a vulgar, insolent charlatan; the people are represented in the person of a credulous and fickle old Demos. At the end, Cleon is discomfited, and old Demos has his youth renewed so that he clearly sees how he has been tricked. It is said that Aristophanes himself was obliged to take the part of Cleon, as no actor was willing to incur the enmity of the influential demagogue. *The Clouds* (423) was not so successful as the two previous plays. Its present form is a revision of the original. This comedy is a satire on the pretensions of the new sophistical school and an attempt to point out its dangerous tendencies. Socrates is taken as the representative of that school, whether because Aristophanes did not understand his teachings, or because he was a convenient butt, is uncertain. It represents a young Athenian, Phidippides, who is ruining his father by his spendthrift habits. So the old man sends him to the "thinking-shop" of Socrates, where he can learn to make the worse appear the better cause and so save his father. The son, after some hesitation, reluctantly enters the school, and learns his lesson all too well. A famous scene represents a dialogue between the Just and Unjust Argument, in which the latter wins and obtains the mastery over the pupil. The youth returns to his home thoroughly trained in the new sophistic, and at a festival made by his father for his return, sings an immoral passage from Euripides, thrashes his father, and then justifies what he has done by the art he has just learned. His old father's eyes are now opened, and he takes vengeance on Socrates by setting his "thinking-shop" on fire. It is said that the reckless young Phidippides was intended to represent Alcibiades. *The Wasps* (422) is a ridicule of the regular courts of justice. The *Peace* (421) is a play in the interests of the truce between the Athenians and the Spartans consummated in this year. Peace is brought down from heaven and restored to earth.

Seven years passed before Aristophanes produced another play. In the meantime public measures had been taken to check political satire, and *The Birds* (414) ridicules the Athenians' fondness for litigation and their flighty character. Two old men leave Athens in disgust, and with the birds establish the city Cloud-cuckoo-town, in mid-air, shut off the gods from enjoying sacrifice, and win back the sceptre from Zeus. The whole play is very brilliant and clever. Some have wished to see in it a caricature of the Athenians' hopes of founding a great western empire in Sicily. The *Lysistrata* (411) represents a woman's conspiracy to bring about peace. The *Thesmophoriazusæ*, produced three months after the preceding comedy, contains an attack on Euripides, whom the women, who are celebrating the Thesmophoria, propose to punish for his hatred of them. *The Frogs* (405) is devoted to literary criticism. In the opening scenes Dionysus is on his way to Hades in search of a good poet, for Sophocles and Euripides have just died. The remainder of the play is given to the adventures of Dionysus in Hades, and the contest between Æschylus and Euripides for the seat of honor there, which Æschylus wins. The real subject is the decay of tragic art, for which Euripides is blamed. The *Ecclesiazusæ* (392 or 389 B.C.), or *The Women in Parliament*, is a satire on communistic ideas current at this time. The women disguised as men occupy the Pnyx, and adopt a new thoroughgoing communistic constitution. In the *Plutus* (which failed in 408, but was revived in 388) the god of wealth has his sight restored to him, and thereafter confers his blessings only on the deserving.

It will be seen that in the extant plays there is a gradual change from political and personal satire to caricature of social conditions; furthermore, the local character of the earlier plays gives way in the later to a certain cosmopolitanism. These, therefore, form the transition to the middle and new comedy. Aristophanes, in the opinion of the ancients, held a middle place between his older contemporaries, Cratinus and Eupolis, combining the severe character of the one with the grace of the other. In wit, rollicking humor, invention, skill in the use of language and rhythm, he has never been surpassed. The text is best edited by Meineke (Leipzig, 1860), and Blaydes (Halle, 1886). The Scholia are published by G. Dindorf (Oxford, 1835); Dübner (Paris, 1842), and from the Ravenna MS., by Rutherford (1896). There are numerous commentated editions of single plays. English translations have been made by Mitchell, Frere, Rogers, Kennedy, and Tyrrell.

ARISTOPHANES OF BYZANTIUM. A learned Greek grammarian of the Second Century B.C. He was a pupil of Zenodotus at Alexandria, where he was subsequently instructor of the famous critic Aristarchus of Samothrace, and director of the great library. He was the first to attempt a critical edition of the Homeric poems, and made extensive study of Plato, Aristotle, Alcæus, Pindar, and the comic and tragic poets. He is said to have introduced into the Greek language the use of accents.

ARISTOPHANES, The English. A name applied to Samuel Foote (q.v.), who lashed the manners and people of his age with a coarse but irresistible wit.

ARISTOPHANES, The French. An appellation, though hardly a happy one, given to Molière for his genial wit, the object of which was the vice and affectation of his day.

ARISTOPHANES'S APOLOGY. The sequel to Browning's *Balaustion's Adventure*, published in 1875. It is a long poem in blank verse, supposed to commemorate the defense made by Aristophanes for his comic art, on learning from the venerable Sophocles of the death of the tragedian Euripides.

AR'ISTOTE'LIA. See Maqui.

AR'ISTOTLE (Gk. Ἀριστοτέλης, *Aristotelēs*) (B.C. 384-322). A Greek philosopher, born at Stagira, a Greek town of the Chalcidice, on the Strymonic Gulf, the present Stavro. He came of a family in which the practice of medicine was hereditary, and his father, Nicomachus, was physician-in-ordinary to the Macedonian king, Amyntas II. From his father Aristotle undoubtedly inherited his love for natural science, and through him came into relation with the royal house of Macedonia. Nicomachus died while Aristotle was still young; the son was brought up in Stagira by a family friend, Proxenus, of Atarneus in Mysia, whose memory he held so dear that in after life he erected a statue to him at Delphi, and after his death educated and adopted his son Nicanor. Aristotle doubtless received the usual education enjoyed by the son of a well-to-do family, and probably was trained also for his ancestral profession. When seventeen years old, he went to Athens and associated himself with the Academy. But its head, Plato, was then absent on his second journey to Syracuse, where he acted as adviser to the two despots in succession, Dionysius the elder and Dionysius the younger. For nearly twenty years Aristotle enjoyed the teaching and association of Plato, and in spite of the different natures of master and pupil, it needs no argument to show that the relation between the two was close. Plato is said to have called him the reader and intellect of his school, and, because of his zeal, to have likened him to a colt that needs the bit more than the spur. During this period of discipleship, Aristotle seems to have begun to lecture to small circles of listeners, chiefly on the subject of rhetoric; at the same time he trained himself to a high degree of perfection in the practice of oratory. His superior genius was so well recognized by his contemporaries that his elders, like Heraclides Ponticus, who was Plato's representative in B.C. 361, were ready to yield to him, and younger men like Theophrastus were glad to be his followers. At Plato's death in B.C. 348-347, Speusippus became head of the Academy, and Aristotle had no longer any bonds to bind him to the school. He was now in his thirty-eighth year, had enjoyed long intimacy with the best thinkers in Greece, and had undoubtedly already developed to a considerable degree an independent philosophical position. With Xenocrates of Chalcedon, who likewise withdrew from his old associates, Aristotle went to Mysia, and presently accepted an invitation from a former fellow-pupil in the Academy, Hermeas, headman of Atarneus, to take up his residence with him. Here he remained three years, until Hermeas was, through treachery, captured by the Persians, and put to death by Artaxerxes III. Aristotle sought refuge in Mytilene, taking with him the niece and sister of Hermeas; he afterwards married the latter, who died something more than ten years later in Macedonia. On the basis of certain allusions in the opening of Isocrates's *Panathenaïcus* it has been conjectured that the following two years Aristotle spent again in Athens, teaching in company with others in the Lyceum; this conjecture, however, has a very uncertain basis.

During the many years spent at Athens and in Asia Minor, Aristotle's hereditary relation with the Macedonian court seems to have been unbroken; for in B.C. 343-42 in response to a call from Philip to educate his son Alexander, then fourteen years old, he removed with his family and Theophrastus to Pella, the Macedonian capital. He acted as tutor to the Prince for three years. The plan of the education attempted by him is unknown to us; but it is most probable that the philosopher added to the ordinary education of the day in rhetoric and philosophy some instruction in at least history, geography, and politics suited to a future ruler. How far his pupil absorbed teaching is also uncertain, although we know that his later plans for conquest were in opposition to Aristotle's views. Yet Aristotle was held in high esteem by both Philip and Alexander; during his residence at court he was able to obtain the restoration, at the public expense, of his native city, which had suffered severely in B.C. 348 when Philip conquered the district about the Strymon; later he was able to secure from Alexander protection for Eresus, in Lesbos, the home of his friend Theophrastus. The greatest favors he received, however, were in the way of support and material for his scientific investigations; and his years of residence at the Macedonian court, where he could observe at close range the rule of an aggressive monarch, must have been of the greatest importance in developing his political ideas.

After Alexander mounted the throne and undertook his Eastern conquests, Aristotle returned to Athens in his fiftieth year, to carry out a plan, no doubt long cherished, of opening a school of his own. This he established in the Lyceum, in a building called "The Walk" (περίπατος), where he lectured. We hear from an untrustworthy tradition that he gave two kinds of instruction: in the morning to a narrow circle of advanced pupils (his esoteric doctrine), and in the evening, more popular lectures (exoteric teaching) to a larger body of listeners. The name Peripatetic, applied to the school and its philosophy, cannot be traced earlier than B.C. 200. Of the equipment of the school, in books and material, we know nothing. Aristotle continued to teach for twelve years, until Alexander's death, in B.C. 323, made his position in Athens dangerous. He was charged with impiety, but fled to Chalcis, as he said, to save the Athenians from a second sin against philosophy. Here he died, in B.C. 322, in his sixty-third year. Theophrastus and Eudemus were his immediate successors in the leadership of the school.

Aristotle left behind him an enormous number of writings. Diogenes Laërtius, of uncertain date, gives us a list of 46 works. This probably represents the works bearing Aristotle's name in the Alexandrian Library. A list dating from the time of Cicero makes the total much larger. An ancient tradition says that at the death of Theophrastus, his library, including of course the works of Aristotle, was left to a certain Neleus of Scepsis. His descendants buried the books to save them from the rapacity of the Attalids, who were eager to enrich the Pergamene Library by every possible means. About 100 B.C. the buried collection, naturally much injured by damp and worms, was discovered by Apellicon of Teos, a learned bibliophile, who brought it to Athens. When Sulla captured the city, B.C. 86, he took the books to Rome, where their value was recognized by the grammarian Tyrannion, who had a catalogue prepared by the Peripatetic Andronicus—the longer list mentioned above—and about 46 B.C. published the works thus recovered. Our present recension undoubtedly goes back to this edition, although it is more immediately related to a recension prepared toward the end of antiquity which embraced a number of spurious writings. The later Peripatetics divided the complete works of their master into two classes: exoteric dialogues intended for the public, and acroamatic for the small circle of pupils. To these may be added as a third class certain writings not intended for publication, the hypomnematic works consisting of memoranda and collections on various topics. The exoteric dialogues were well known and much admired in antiquity, but only bare fragments have come down to us. These dialogues did not possess the dramatic character of Plato's works; in place of question and answer, they had long discourses, such as we find in the philosophical writings of Cicero, who chose Aristotle as his model. Among the titles known to us are *On the Immortality of the Soul, On Philosophy, On the Good, On Justice,* etc. Certain titles, e.g. *Menexenus, Gryllus, Nerinthus, The Sophist,* etc., remind us of Plato's dialogues. Aristotle carefully prepared these for publication, and must have exhibited in them that perfection of style which caused Cicero to speak of the philosopher's language as a golden stream. The extant works show but little of this quality. These were never completely prepared, and in many cases probably never intended for publication by Aristotle, but were edited by Theophrastus, Eudemus, and the philosopher's son, Nicomachus. Many have the character of lecture notes, possibly those taken by pupils, and most have suffered from interpolations. A considerable number of the works to which his name is now attached are spurious. The extant writings may be classed according to their contents under Logic, Metaphysics, Natural Science, Ethics and Politics, Rhetoric and Poetics.

The works on Logic were called by the later Peripatetics the *Organon*, "The Instrument," as they deal with the method of investigation. They include the *Categories*, on the ten classes of predicates—substance, quantity, quality, etc.; *On Interpretation*, dealing with the proposition and its parts; *Analytica Priora*, in two books on the syllogism; *Analytica Posteriora* in two books on the theory of knowledge and the scientific method; *Topica* in eight books, on dialectics and reasoning from probabilities; and *Sophisms* on the fallacies of the Sophists and their solution. Aristotle's claim that he was the first to work out a method of reasoning was correct, and formal logic has made little advance since his day; it has only added to his categorical syllogism the hypothetical and disjunctive forms, and has supplemented his three figures by a fourth.

The *Metaphysics* in thirteen books bears the name given it by later students, because it followed the works on physics in the ancient editions of Aristotle. The philosopher himself called it "First Philosophy" (πρώτη φιλοσοφία). It is in an unsatisfactory condition, consisting of one finished treatise and a number of shorter sketches hardly connected or fully worked out. It begins with a criticism of previous philosophical systems—the earliest history of philosophy—and then, after stating the philosophical questions preliminary to the examination, discusses the doctrine and the ultimate grounds of Being.

The works on Natural Science comprise the *Physics* in eight books, treating of the general principles and relations of nature; four books *On the Heavens*, and two on *Beginning* and *Perishing*. The last treatise is important for a knowledge of Aristotelian philosophy. The *Meteorology* discusses the phenomena of the heavens. Natural History is handled in ten books; with it are associated the following treatises: *Parts of Animals* in four books, *Generation* in five, and *Mode of Progression* in one. To these must be added certain works of doubtful authenticity: *On Plants* in two books, a retranslation from the Latin and probably the work of Nicolaüs of Damascus, who composed, under Augustus, a compendium of Aristotle's philosophy; *On the Cosmos*, certainly belonging to the Roman period; *On the Motion of Animals, On Breathing, On Colors of Plants and Animals,* all later than Aristotle. The treatise on *Physiognomy*, which was composed certainly as late as Hadrian's time, is based apparently on two lost works named in the ancient catalogues of the Aristotelian writings. The *Problems*, discussions chiefly of physical questions, is also drawn in part from the philosopher's work. The *Mechanics, Mirabiles Auscultationes*, and some other minor monographs falling within the same field are certainly spurious.

According to Aristotle's own view, psychology was inseparably connected with natural science. Under this head we possess his work *On the Soul* in three books, and a large number of smaller treatises which are known as the *Parva Naturalia*.

Next must be named the works on Ethics and Politics, which Aristotle regarded as parts of the same subject. Under the former division there are extant three works: The *Nicomachean Ethics* in ten books, which takes its name from the philosopher's son, Nicomachus, to whom the work is dedicated and by whom it probably was edited. This is Aristotle's work. *The Eudemean Ethics* in seven books was prepared by Aristotle's pupil Eudemus on the basis of his master's lectures and the *Nicomachean Ethics*, with which it coincides in parts. The *Magna Moralia* in two books is a late work of the Peripatetic School, and nothing more than an abstract of the other works. An essay *On Virtues and Vices* is also spurious. The *Politics* in eight books is closely connected with the *Ethics*. The work is incomplete but masterly, discussing the elements and aims of the State, the forms of government, and the ideal State. The loss of the *Constitutions*, which treated of 158 States, is greatly to be regretted; but fortunately the greater part of the *Constitution of Athens*, which belonged to the larger work, has been recovered in recent years from four papyrus rolls of the First Century A.D., first published by Kenyon in 1891. This document is one of the most valuable for the history of Athens, and has at many points corrected and enlarged our previous knowledge. The *Economics* in three books is the work of the later School.

In the field of Rhetoric and Poetics, Aristotle also made contributions of the highest value and permanence. His *Rhetoric* in three books treats of the relations of rhetoric to dialectic, the nature of the proof the orator may employ, the use of examples, and language and style. In this work also appear beginnings of formal grammar and its technical terms. The *Rhetoric* addressed to Alexander, which is catalogued with Aristotle's works, was written by Anaximenes. Of the *Poetics*, only the first book on tragedy and epic poetry is preserved, but this is of inestimable value for its analyses of the various kinds of poetry and its full treatment of tragedy.

From this enumeration of the most important extant writings of Aristotle, the universality of his studies is evident; and in every field enumerated his influence has been enormous. By him Logic, Grammar, Rhetoric, Literary Criticism, Politics, Psychology, Ethics, Natural History, Physiology, were raised to independent disciplines; he was the first to attempt a history of Philosophy and Government. This many-sided literary activity was the natural result of his method of working, proceeding from the individual to the general; and this method, which collects facts, compares, sifts, and groups them according to their relations, and thus obtains systematic knowledge of the subject in hand, has been most fruitful in the history of investigation of every sort, especially in the Nineteenth Century.

Aristotle's service lies in his analysis and clear distinction of ideas and in his studies in particular fields, rather than in the full development of a philosophy. Yet here he made important advances that have been influential down to the present day. According to him, Being has four universal elements: Matter, form or essence, the efficient cause, and the final cause. These principles enter into the constitution of everything. Matter is mere potentiality, which through the supervention of Form becomes the Actual. By Form, Aristotle wished to replace the Platonic idea, which, he pointed out, cannot exist apart from the individual. Every change from potentiality to actuality is accomplished by an efficient cause which is working toward an end, the Final Cause. In the field of Ethics this final cause is man's *summum bonum*, happiness, which is defined to be the activity of the soul in accordance with virtue, but under favorable conditions. The problem of free-will Aristotle met by the statement that man has a potentiality in two opposite directions—for good or evil—which can be freely chosen; by consistently choosing one a man forms the habit of virtue or vice, and thus becomes either virtuous or vicious, as his choice determines. Virtue itself lies between the extremes of self-indulgence and asceticism.

The influence of Aristotle on human thought has continued unbroken to the present day. In the early centuries of our era his writings stimulated scientific inquiry; during the Middle Ages Latin translations from the Arabic versions guided the philosophy of the Western Church, although the real nature of Aristotelianism was little understood. Arabian philosophy in the West during the Eleventh and Twelfth centuries was a combination of Aristotelianism with certain Neo-Platonic elements. With the revival of learning the original of Aristotle's works became gradually known, and from them were drawn the means to combat the errors of scholasticism.

Learned comment on Aristotle began with the First Century B.C., and during antiquity and the early mediæval period the amount of comment grew to be enormous. The standard edition of the works is still that by Bekker (5 vols., 1831-40). Volumes I. and II. contain the Greek text; III., the Latin translations; IV., scholia, edited by Brandis; V., the fragments, edited by Rose, and Bonitz's index. A new and complete edition of the ancient commentaries is being published by the Prussian Academy. Twenty-five volumes have already appeared. Of editions of single works, the following are valuable: Trendelenburg's *Psychology* (1877); Schwegler-Bonitz's *Metaphysics* (1848); Ramsauer's *Nicomachean Ethics* (1878); Susemihl's *Politics* (1879); Spengel's *Rhetoric* (1867); Vahlen's *Poetics* (1884). Useful English works of general import are Grote's *Aristotle* (1872); Grant's *Ethics of Aristotle* (London and Edinburgh, 1877); Bywater, *Ethics* (1890); Jowett, *Politics* (1885); Newman, *Politics* (1887); Wallace, *Psychology* (1884). General bibliography by Schwab, *Bibliographie d'Aristote* (Paris, 1896). For influence of Aristotle upon Arabic philosophy, see ARABIC LANGUAGE; AVERROËS.

AR'ISTOX'ENUS (Gk. *'Αριστόξενος, Aristoxenos*) (Fourth Century B.C.). The greatest student in Greek antiquity of the science of rhythm and music. He was a son of Spintharus, and a native of Tarentum. He received his first instruction from his father, who had himself been a pupil of Socrates and was well versed in musical matters. He later studied music under Lamprus of Erythræ, and music and philosophy under the Pythagorean Xenophilus of Chalcidice. He finally went to Athens and became the pupil of Aristotle. It is said that he expected, upon the death of Aristotle, to be appointed his successor, and was deeply chagrined when Theophrastus was made head of the school instead. He remained at Athens, however, and is said in the course of his life to have written 453 treatises on various subjects—musical, philosophical, and moral. His method was that of Aristotle. One of his tenets was that the notes of the scale were to be judged entirely by the ear, and not, as the Pythagoreans held, by mathematical properties. The only one of his works that has come down to us—and this, not in the original or complete form—is the *Elements of Harmony* (*'Αρμονικὰ Στοιχεῖα, Harmonika Stoicheia*), in three books. The best edition is that of Marquard (Berlin, 1868).

ARISUGAWA, ä'rê-sōō-gä'wȧ. The name of a noble family in Japan whose members, besides showing marked ability, have been prominent in the rejuvenation of that ancient empire. The house was founded by the seventh son of the Mikado Go-Yozei, who reigned from 1587 to 1611 and died in 1638. When in January, 1868, the duarchy of Mikado and Shogun was abolished and the existing government of Japan established by the restoration of the Emperor Mutsuhito to undivided power, ARISUGAWA TARUHITO (1835-86), uncle of the Mikado, born in Kioto, and carefully educated, was appointed supreme administrator and commander-in-chief of the army. Receiving the sword of justice and the brocade banner, he led the imperial troops against the rebels, saved Yeddo from destruction, and then directed the military operations in the north which brought the civil war to a happy conclusion. In 1869 he returned to the Emperor the sword and banner in token of complete pacification of the empire. In 1875 he was made President of the Senate, and in 1877 received supreme command of the forces, which, after seven months of fighting and the loss of 20,000 lives and $50,000,000, suppressed the Satsuma rebellion led by Saigo Takamori, for which Arisugawa was decorated with the Order of the Chrysanthemum and made field-marshal and junior prime minister. ARISUGAWA TAKEHITO (1862-95), brother of the above, was adopted by the Emperor (when without an heir) in 1878. He traveled and studied in Europe, examining military systems, received the highest decorations, served for education as midshipman on H. B. M. ship *Iron Duke*, and as captain in the Japanese navy in the war with China (1894-95), dying in service. The first memorial postage stamps ever issued in Japan showed his portrait. The allowance of the Arisugawa family out of the civil list is 30,000 yen.

ARITA, ȧ-rē'tȧ. A town of Japan situated in the western part of Kiushiu, about 58 miles north of Nagasaki, with which it is connected by rail. It is famous chiefly for its pottery works, established at the end of the Sixteenth Century. The porcelain of Arita used to be exported in large quantities to the Netherlands and is very highly valued. Population, about 6000.

ARITH'METIC (Gk. ἀριθμητική, sc. τέχνη, *arithmētikē technē*, the art of reckoning, from ἀριθμός, *arithmos*, number). This primitive mathematical science involves three phases: the conception of number, the representation of numbers by symbols, and the principles and methods of computation. To these may be added the rules of ordinary business, which have come to be considered part of the elements of the subject.

THE CONCEPTION OF NUMBER. Kant advanced the idea that the number-concept is derived from sequence in time, and accordingly Sir William Hamilton speaks of "the science of pure time." In recent years the Kantian idea has led to a revival, in teaching arithmetic, of the older methods, based on the cultivation of a sense for rhythmic repetition, i.e., on counting—number being regarded as a product of reflection, of an activity of the mind. On the contrary, the Pestalozzian method, which was generally employed until some years ago, followed the idea that perception alone forms the basis of all number work, and that the origin of the number-concept is to be sought not in time, but in space. This principle has often been overworked. Some teachers have presented a variety of objects so systematically that the pupil learned to think of nine horses, nine feet, nine dollars, and was unable to think of the number nine without the aid of a group of objects. The reaction against the Pestalozzian plan has led teachers to lay greater emphasis on phenomena taking place successively in time; thus, to distinguish nine from six, the pupil is made to hear the clock strike the hours.

REPRESENTATION OF NUMBERS BY SYMBOLS. Aside from primitive number-pictures, such as the Egyptian hieroglyphics and the Babylonian cuneiform symbols, the ancients commonly used the letters of their alphabets to represent numbers—e.g., the a, β, γ, δ, of the Greeks. Somewhat more refined is the system of the Romans, who used only a limited set of letters, combining these according to simple additive and subtractive principles. But even in the Roman notation no extended calculations were possible without the aid of some registering instrument; hence the early and extensive use of the abacus. (See CALCULATING MACHINES.) The notation in use at present, which consists in combining ten digits according to a simple position-system, originated with the Hindus, was transmitted to the Arabs, and came to the knowledge of Europeans chiefly through the labors of Leonardo of Pisa, about A.D. 1200. This powerful system freed arithmetic from the reign of the abacus.

As to fractional numbers, the Ahmes papyrus, which is at least thirty-six centuries old, shows that the Egyptians had a knowledge of fractions at a very remote date. But while the concept and symbolism of the common fraction are thus very old, the decimal fraction, the decimal point, and other improvements in notation, are comparatively recent, dating from the Sixteenth and Seventeenth centuries.

Besides the decimal scale, fractions have also been written on various other scales, such as the binary (scale of two), ternary (scale of three), . . . duodenary (scale of twelve), and notably the sexagesimal (scale of sixty) by the Egyptians and Babylonians. At present, the scale of ten is generally recognized as the most convenient. The scale of twelve, however, has the advantage of producing simpler fractional forms. E.g., on the scale of ten the fractions ⅓, ¼, ⅛, are written, respectively, 0.333. . . , 0.25, 0.125; on the scale of twelve they are written, 0.4, 0.3, 0.16.

ARITHMETIC COMPUTATION. The methods of carrying out the basal operations of arithmetic have been considerably improved since the Fifteenth Century. The old 'galley' method of division was replaced by the 'Italian' method, the superiority of which may be seen from the following examples:

Galley.

97535399 ÷ 9876, carried for one figure only:

$$\begin{array}{r@{}l}
86 & \\
\cancel{9}\cancel{7}5 & \\
\cancel{1}\cancel{6}\cancel{2}\cancel{0} & \\
\cancel{9}\cancel{7}\cancel{5}\cancel{3}\cancel{5}399 & (9 \\
\cdot\,\cancel{9}\cancel{8}\cancel{7}\cancel{6} &
\end{array}$$

Italian.

32.92 ÷ 3.1416

$$\begin{array}{r@{}l}
3.1416)\,32.9200 & (10.48 \\
31416 & \\
\hline
150400 & \\
125664 & \\
\hline
247360 &
\end{array}$$

Logarithms, the greatest arithmetical achievement of the Seventeenth Century, were introduced by Napier (q.v.) in 1614. Many changes for the better have also been made in the operations for finding the square root and in the algorisms of applied arithmetic.

As to improvements that may be expected to be introduced in the future, the 'Italian' method of division seems destined to yield to the so-called 'Austrian' algorism, which is represented by the following example:

```
                              Austrian.
                                  10.48
                         31416)329200
  32.92 ÷ 3.1416                3142
                                ----
                                 150
                                 126
                                 ---
                                  24
                                  24
```

Further, proportion, or the old 'rule of three,' will probably be replaced by the equation as such, and the same may be expected for unitary analysis.

Regarding the teaching of arithmetic, the student of pedagogy will look for information to the writers of the Nineteenth Century. The following may be recommended as valuable works on the history and pedagogy of the subject: Unger, *Die Methodik der praktischen Arithmetik in historischer Entwickelung* (Leipzig, 1888); Kehr, *Geschichte der Methodik* (Gotha, 1888, Vol. III.); W. Rein, A. Pickel, and E. Scheller, *Theorie und Praxis des Volksschulunterrichts nach Herbartischen Grundsätzen* (Leipzig, 1898); J. A. McLellan and J. Dewey, *Psychology of Number* (New York, 1895); D. E. Smith, *Teaching of Elementary Mathematics* (New York, 1900). Notable among higher arithmetics are: Tannery, *Leçons d'arithmétique théorique et pratique* (Paris, 1894); and W. W. Beman and D. E. Smith's *Higher Arithmetic* (Boston, 1897).

ARITHMETICAL PROGRES′SION. See Series.

AR′ITHMET′IC AND GE′OMET′RIC SIGNS. Arbitrary symbols used to indicate: (1) the nature of a magnitude, as $+a$, a positive quantity, and $-a$, a negative quantity; (2) operations to be performed upon magnitudes, as $a \cdot b$, i.e., b multiplied by a; (3) relations between magnitudes, as $a > b$, i.e., a is greater than b. The following are a few signs in common use:

0, 1, 2, 3, 4, 5, 6, 7, 8, 9, are the Hindu numerals.

I, II, III, IV, V, VI, etc., are Roman numerals.

$+$ (plus); $-$ (minus); $\pm$ (plus or minus); $\times$ or $\cdot$ (times or multiplied by); $\div$, $/$ or the fraction bar (divided by); $=$ (equal to); $a \equiv b$ (a is identical with b); $a \equiv b \pmod{m}$ (a is congruent to b, modulus m); $a > b$ (a is greater than b); $a < b$ (a is less than b); $a \backsim b$ (a is similar to b); $a \propto b$ (a varies as b); ∞ (infinity); $a \doteq b$ (a approaches b as a limit); $\therefore$ (therefore); $\because$ (since); $|-a|$ (absolute value of $-a$; $\angle A$ (angle A); $\perp$ (perpendicular to); $\cong$ (congruent to, i.e., similar and equal); $\surd$ (root of); π (ratio of the circumference of a circle to its diameter); e (base of the hyperbolic logarithms).

ARITHMETIC COM′PLEMENT. The difference between a number and the next larger number representing a power of 10. Thus, the arithmetic complement of 7 is $10 - 7$, or 3; the arithmetic complement of 85 is $100 - 85$, or 15; that of 125 is $1000 - 125$, or 875. The arithmetic complement is much used in numerical calculations where differences are to be found. Since $a - b = a + (10^n - b) - 10^n$, it follows that instead of subtracting a number its arithmetic complement may be added, the corresponding power of 10 being then deducted. Thus, $456 - 273 = 456 + 727 - 1000 = 183$. The advantage consists in this, that since the arithmetic complement of a number is easily found by subtracting each digit from 9, except the unit's (which is taken from 10), it is often easier to add the arithmetic complement than to subtract the number. In working with logarithms arithmetic complements are often used instead of their numbers, under the name of co-logarithms. See Logarithm.

ARITHMETIC MEAN. See Mean.

ARITHMETIC TRI′ANGLE. See Pascal.

ARITHMOGRAPH. See Calculating Machine.

ARI THORGILSSON, ä′rē tôr′gēl-sōn (1067-1148). The father of Icelandic literature. His *Islendingabók*, the first literary work of the island, was finished between 1134 and 1138, and is a concise account of the history of Iceland from its settlement, about 870, till 1120. See Icelandic Literature.

ARI′US (c.256-336). The father of Arianism, the doctrine that Christ was not of the same essence as God the Father, but was a creature, though the first and highest of creation. He was born in Libya, the North African province to the west of Egypt, about 256. He went to Alexandria and there was made deacon and presbyter, and was the highly esteemed pastor of a church called, from its shape, the Baucalis (the Greek name of a kind of vase). In 318 he denied the statement which Alexander of Alexandria made upon the Trinity: viz., that there was only a single essence. This he declared was Sabellian. Defining his own position, he affirmed that if the Son were truly a son, there must have been a time when he was not. For this statement he was applauded by many, but Alexander called a council of a hundred Egyptian and Libyan bishops, which condemned Arius and his allies and deposed them (321). The fight had now begun. Arius had numerous supporters, chief of whom was Eusebius, Bishop of Nicomedia. Alexander also rallied a large contingent. He wrote numerous letters (two of which are still extant), exhorting the bishops not to receive the heretic. Notwithstanding this active canvass by Alexander, Eusebius of Nicomedia absolved Arius, who had retired to Palestine and then to Nicomedia, from the Alexandrian's condemnation, and had Arius's position approved by a synod held in 323, probably in Nicomedia. Arius wrote *The Banquet*, a work in prose and verse, of which fragments remain. It sets forth his view of the person of Christ and put it in a form so that it could be sung to popular tunes. This is said to have aided his cause greatly. The strife attracted the attention of the Emperor Constantine, as it was troubling the peace of the Church and disuniting it. Constantine did not appreciate the importance of the doctrine involved, and so thought the controversy could be healed by mutual concessions. He empowered Hosius, Bishop of Cordova, who was his ecclesiastical adviser, to represent him in an effort at Alexandria to smooth matters over; but when Hosius reported failure, he took more active measures, and called a general Church council at Nicæa, in Bithynia (325), the first Œcumenical Council, at which the point raised by Arius was settled against him. This result was effected by the champion of Christ's divinity who then appeared—Athanasius, a young deacon of Alexandria, and spokesman for his bishop, Alexander. Three hundred and eighteen bishops, besides numerous other clergy of all grades, were present. Four parties were formed—the strict Arians, led by Arius himself (who was present), who contended that Christ was of different essence (*heteroousios*) from the Father; the strict Athanasians, who contended that he was of the same essence (*homoousios*); the party of Eusebius of Nicomedia; and that of Eusebuis of Cæsarea. The creed of the Nicomedian Eusebians was essentially Arian, and was rejected by the Council without debate; in fact, the document containing it was torn to shreds. The creed of the Cæsarean Eusebians, which was designed to be a compromise, was respectfully received, as it was an old Church one; but the steady persistence of the Athanasian party forced the Council to reject it and make a new deliverance, in which Arianism was unequivocally condemned. The upshot was that Arius and his episcopal supporters were banished to Illyria, and his writings publicly burned and interdicted. This action did not, however, end Arianism; and as for Arius, the great influence of Eusebius of Nicomedia and of Constantia, the sister of Constantine, secured his recall in 331, and in a personal interview with the Emperor, Arius convinced him that his views were in substantial agreement with those of Athanasius.

In the confession of faith which he presented, he declared his belief that the Son was born of the Father before all ages, and that, as the "Word," he had made all things both in heaven and earth. The Emperor was satisfied, and sent orders to Athanasius, now Bishop of Alexandria, to receive Arius into the communion of the Church. This Athanasius refused to do, and a series of tumults was the consequence. Eusebius of Nicomedia was greatly incensed. He called a synod of bishops at Tyre, in 335, which proceeded to depose Athanasius. The Emperor was even prevailed on to remove the latter to Gaul, though he alleged as his reason that he wished to deliver him from the machinations of his enemies. In the same year another synod met at Jerusalem, which revoked the sentence of excommunication uttered against Arius and his friends. Still, the majority of the Christians of Alexandria clung to the doctrines of Athanasius, and resolutely resisted every effort to establish the new opinions among them. Disappointed in his expectations, Arius, in 336, proceeded to Constantinople, where he presented the Emperor with another apparently orthodox confession of faith; whereupon orders were issued to Alexander, Bishop of Constantinople, to administer to Arius the holy communion on the Sunday following. This was naturally considered a grand triumph by Eusebius and his friends; but on the Saturday preceding the day appointed for his restoration, Arius suddenly died of hemorrhage of the bowels.

Arius was exceedingly handsome; but the harassing cares of a life spent in a continual struggle with his adversaries are said to have given him a worn and haggard look. His manners were graceful and modest; he was noted for even an ascetic abstinence, and the purity of his moral character was never challenged by a single enemy.

After the death of Arius, his followers rallied round Eusebius, now Bishop of Constantinople (338), from whom they were styled Eusebians. The reconciliatory middle party of Eusebius of Cæsarea (d.340 A.D.), who wished to end the great controversy by abstaining from all strict dogmatic assertions on the matter, soon dwindled into insignificance between the two contending parties. Constans, who ruled the West after the death of Constantine (337), and Constantius, who ruled the East, made an essay toward reconciliation, but it failed at the Synod of Sardis (347), where the Occidental bishops gathered themselves round Athanasius in support of the *homoousian* doctrine (*identity* or *sameness of substance*), while in a separate council at Philippopolis, the Oriental bishops asserted the *homoiousian doctrine* (implying merely *similarity of substance*). Slight as might appear the verbal difference between the two parties, the bitterness of the controversy was intense, and pervaded almost all departments of public and private life. Constantius having, by the death of Constans (350) and his victory over Magnentius (353), gained dominion over the West, the Arian cause, which he favored, triumphed at the Synod of Arelate or Arles (353), and at that of Milan (355). These victories, however, were more apparent than real. The Nicene doctrine had still strong support on its side, and was strictly maintained by the banished Athanasius and his friends, while the Antinicæans, soon after their triumph, were divided into at least three parties. The old Arians, also styled Anomœoi, or Heterousians, asserted, in the boldest style, their doctrine of "distinct substances." The semi-Arians (a large majority in the Eastern Church) maintained the *homoiousian* doctrine of similar substances. A third party held the same doctrine with some qualification. Morally, the victory was leaning to the side of the Nicæans. Julian the Apostate (361-363), in his hatred of the Christian religion, left all parties at liberty to contend as they pleased with one another, so that they did not interfere with his plans. Jovian and his successors in the West, Valentinian I. and Gratian, extended full toleration to both parties. Arianism, at last, was virtually abolished in the Roman Empire, under Theodosius in the East (379-395), and Valentinian II. in the West. Among the German nations, however, it continued to spread through missionary efforts. Bishop Ulfilas, the translator of the Bible into the Mœso-Gothic language, had been the means of converting the West Goths to Arian Christianity as early as 348, and they adhered to it until the Synod of Toledo in 589. The East Goths, Vandals, Burgundians, the Suevi in Spain, and the Longobards also adopted Arianism; but in all these instances the Nicene doctrine ultimately prevailed, most slowly among the Longobards, who retained the Arian creed until 662. The Arian controversy has never excited any great interest in modern times; yet among Englishmen John Milton was at least a semi-Arian, and it was revived for a time by the writings of the learned Dr. Samuel Clarke (1675-1729), and also by William Whiston (1667-1752). More recently, a part of the Arian doctrine, the denial of "the eternal sonship," was broached in the Wesleyan Methodist Church by Dr. Adam Clarke (1762-1832) and a few followers; but it was soon suppressed by the conference. Pure Arianism can now hardly be said to exist. It has gradually lapsed into Unitarianism. Consult: H. Kölling, *Geschichte der arianischen Häresie von Nikäta* [325] *bis Konstantinopel* [381] (Gütersloh, 1875-83); J. Gummerus, *Die homöusianische Partei bis zum Tode des Konstantius* (Leipzig, 1900). See Athanasius; Christology.

AR'IZO'NA (probably from North American Indian *Arizonac*, small or few springs). A Territory of the southwestern United States, bounded on the north by Utah, on the south by Mexico, on the east by New Mexico, and on the west by California and Nevada (Map: United States, west half, C 4). It lies between latitudes 31° 20′ and 37° N. and longitudes 109° 3′ and 114° 54′ W. It is about 350 miles square, and contains 113,020 square miles, only 100 of which are under water. Compared with States and other Territories, it ranks sixth in area and forty-ninth in population.

Topography. The extension northwestward of the Mexican Cordilleras, which rises beyond the Colorado River in the Sierra Nevada, divides Arizona diagonally into two regions—a southwestern part of low elevation, and a northeastern part consisting of an elevated plateau. The whole Territory, however, is mountainous in the form of short, isolated ranges having a general northwest-southeast trend, which are abrupt, sterile, and gashed by deep cañons and dry water-courses. In the south these mountains rarely reach 3000 feet in height, but in the central line of elevations they are more continuous and lofty, many summits approaching 10,000 feet (Thomas Peak, 11,496; Ord Peak, 10,266; Bill Williams Mountain, 9264; Mount Logan, 7700; Mount Tipton, 7364; Mount Dellenbaugh, 6756, etc.). The highest mountains in the Territory are in the isolated San Francisco Range, in the northern central part, the apex of which reaches 12,794 feet. From these central elevations the Territory slopes rapidly away nearly to sea level in the Gila Valley. The northeastern half of the Territory consists of a broken, cañon-cut, hill-studded, arid table-land, the average altitude of which is over 5000 feet above the sea, with many large areas from 6500 to 8000 feet. The few, and often intermittent rivers, which drain this arid region, serving more as the conduits of sudden rainstorms than as living water-courses, run in narrow cañons, in some cases a mile or more deep. The Rio Colorado (see Colorado River) traverses the northwest corner of the Territory in such a gorge, and then, turning to the south, becomes the western boundary of Arizona to near its mouth. Its few tributaries, of which the Little Colorado in the north alone is important, reach the river through similar cañons. The whole scenery of this northwestern part of the Territory is that of a rough, rocky, dry region, interrupted by steep-sided gorges and scarp-fronted mesas and barren mountains, more or less covered with bunch-grass and scattered, stunted trees. The southern part of the Territory is, on the whole, even more desert-like in appearance, and all the water-courses (most of which are dry except for a short time after rains) lead downward to the Gila, a broad, shallow river flowing into the Colorado near its mouth. The mountains here are mainly of volcanic origin. The only other rivers in Arizona worth mentioning are the Rio Santa Maria and Sandy, which unite in the central western region to form Bill Williams Fork, which enters the Rio Colorado near latitude 34° N., and the Virgin, in the extreme northwest corner of the Territory.

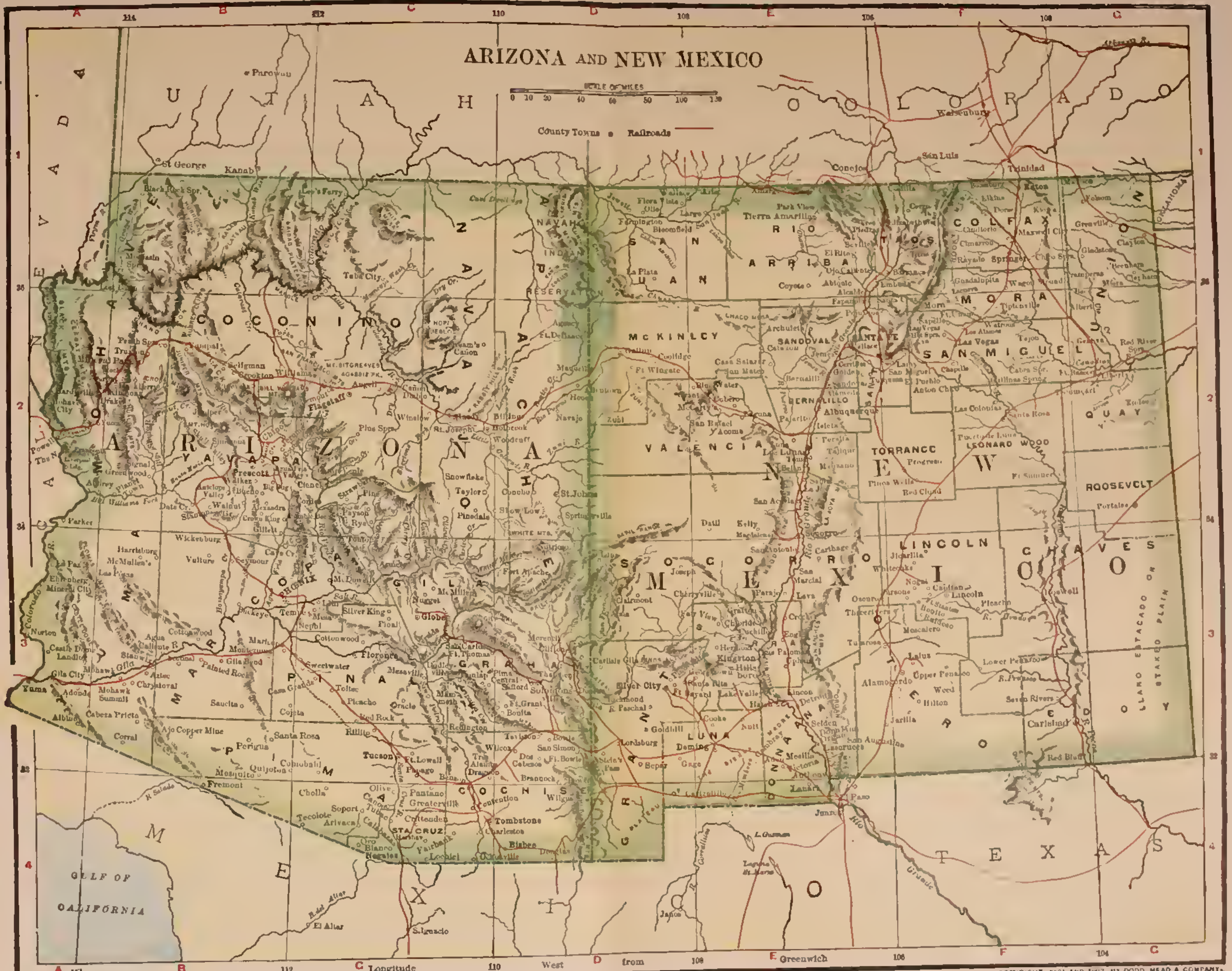
Climate and Soil. The climate of Arizona is, on the whole, dry and healthful, and it has the largest number of clear days of any part of the Union. The northern plateau region has a mean annual temperature of about 45° F., which is almost the same as that of many of the Northern States, but without their extremes; the rainfall here is approximately twenty inches per annum. In the lower lands of the southern half of the Territory the mean temperature is about that of New Orleans (69° F.). The rainfall, however, is much less than that in the northern section, scarcely exceeding an average of five inches per annum—the heaviest fall (about thirteen inches) being in the district of Tucson. The soil varies from light loam to heavy, dense adobe. In many places along the rivers it is very productive when supplied with water. Elsewhere it is alkaline and lacking in nitrogen and humus matter. The flora and fauna are those of the region extending from southern California around to southwestern Texas. See United States, paragraph *Flora;* Rocky Mountains.

Geology. Northern Arizona consists of a vast series of Carboniferous and Mesozoic marine strata covered by a series of Tertiary lacustrine and terrestrial formations; in all, originally some 15,000 feet thick. A great uplift occurred during Eocene time, and subsequent erosion has carved the land surface into mountains and valleys. A second uplift with much volcanic action occurred about the close of Miocene time. In southern Arizona the changes were not so marked. The Territory has abundant deposits of valuable minerals, which are described below in the paragraph on *Mining.* In Navajo County, near Holbrook, whole trunks of trees to the thickness of four feet are found completely silicified and cracked into blocks of beautiful coloring which are of great value for ornamental purposes. See Fossil Forest.

Mining. Arizona probably contains a larger proportion of ore and mineral-bearing land than any other member of the Union, but the lack of transportation facilities has prevented a normal development of the mining industry. In spite of this difficulty, however, mining has been undergoing a steady growth, and constitutes the most important industry of the Territory. Copper mining, in which Arizona ranks next to Michigan and Montana, is the most important. The Territory produces more than one-fifth of the total output of the United States. There has been a steady increase in the copper output of Arizona, rising from 23,874,963 pounds in 1883 to 133,-

AREA AND POPULATION OF ARIZONA BY COUNTIES.

County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
Apache	D 2	Saint Johns	10,736	4,281	8,297
Cochise	D 4	Tombstone	6,147	6,938	9,251
Coconino	B 2	Flagstaff	19,322		5,514
Gila	C 3	Globe	4,542	2,021	4,973
Graham	D 3	Solomonsville	6,500	5,970	14,162
Maricopa	B 3	Phoenix	8,816	10.986	20,457
Mohave	A 2	Kingman	13,421	1,444	3,426
Navajo	C 2	Holbrook	9,826		8,829
Pima	A 4	Tucson	9.424	12,673	14,689
Pinal	C 3	Florence	5,324	4,251	7,779
Santa Cruz	C 4	Nogales	1,212		4,545
Yavapai	B 2	Prescott	7,863	8,685	13,799
Yuma	A 3	Yuma	9,787	2,671	4,145
San Carlos Indian reservation	C 1				3,065



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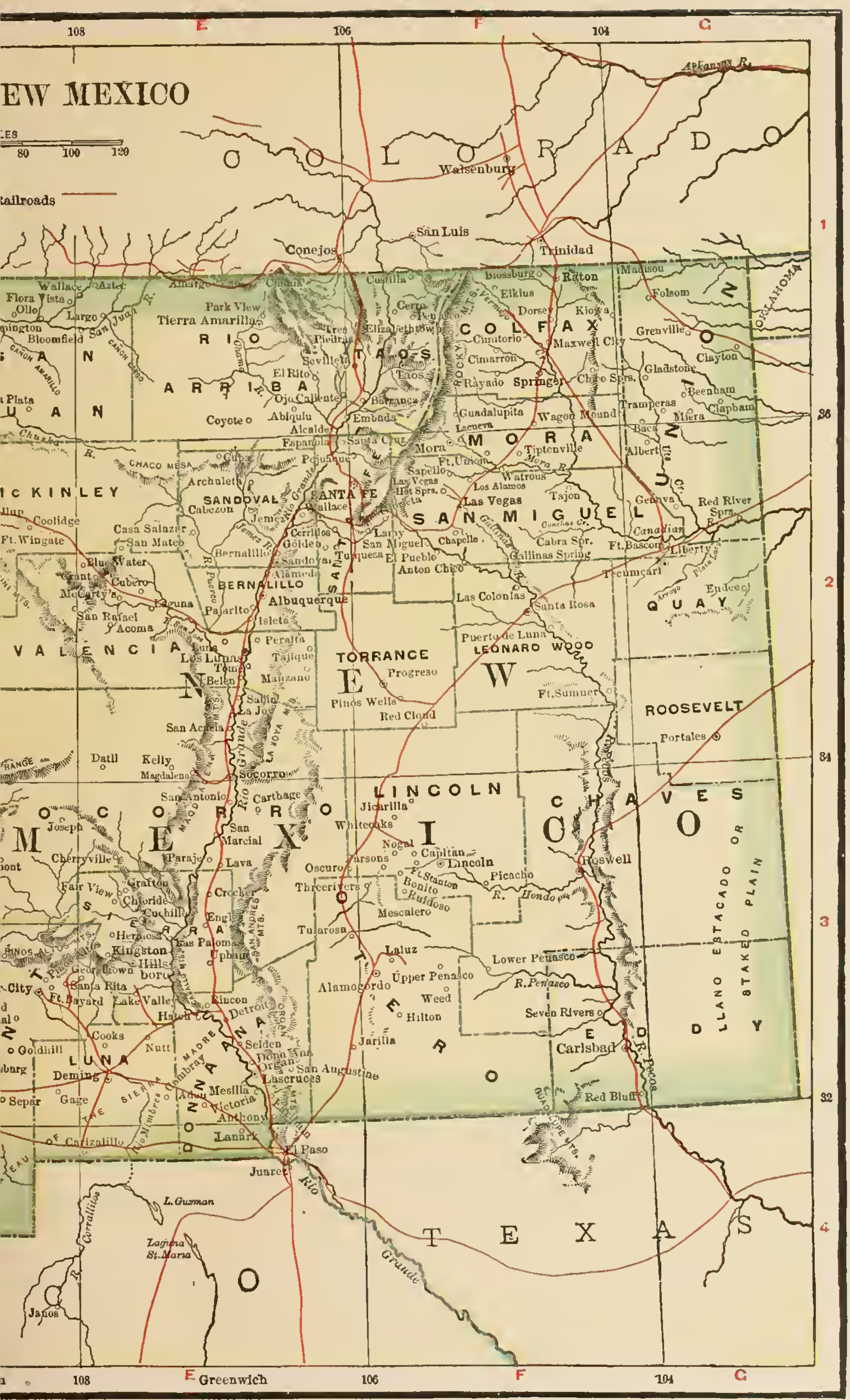

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AREA AND POPULATION OF NEW MEXICO BY COUNTIES.

County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
Bernalillo	E 2	Albuquerque	8,842	20,913	28,630
Chaves	F 3	Roswell	11,520	.....	4,773
Colfax	F 1	Raton	3,784	7,974	10,150
Donna Ana	E 3	Lascruces	5,001	9,191	10,187
Eddy	G 3	Carlsbad	6,613	.....	3,229
Grant	D 4	Silver City	9,327	9,657	12,883
Guadalupe	G 2	Puerto de Luna	6,987	.....	5,429
*Leonard Wood	F 2	Santa Rosa	.....	.....	.....
Lincoln	F 3	Lincoln	4,984	7,081	4,953
*Luna	E 3	.....	.....	.....	.....
*McKinley	D 2	.....	.....	.....	.....
Mora	F 2	Mora	2,532	10,618	10,304
Otero	E 3	Alamogordo	6,874	.....	4,791
*Quay	G 2	Tecumcari	.....	.....	.....
Rio Arriba	E 1	Tierra Amarilla	6,655	11,534	13,777
*Roosevelt	G 2	Portales	.....	.....	.....
*Sandoval	E 2	Sandoval	.....	.....	.....
San Juan	D 1	Aztec	5,742	1,890	4,828
San Miguel	F 2	Las Vegas	4,833	24,204	22,053
Santa Fé	E 2	Santa Fé.	2,212	13,562	14,658
Sierra	E 3	Hillsboro	3,129	3,630	3,158
Socorro	E 3	Socorro	15,386	9,595	12,195
Taos	F 1	Taos	2,265	9,868	10,889
†Torrance	F 2	Progreso	.....	.....	.....
Union	G 1	Clayton	6,302	.....	4,528
Valencia	E 2	Los Lunas	9,472	13,876	13,895

* Established since the last census was taken.

† The organization of Torrance County is to be completed January 1, 1905.

054,860 in 1899. There was a decrease in 1900, when the production was 118,317,764 pounds, which was due to accidental causes and not to an exhaustion of the mines. Gold mining is next in importance. The output of gold for the five-year period ending with 1900 had an average annual value of over $2,500,000. This was nearly three times the output for 1889and twelve times that of 1880. The output of silver during the same period, on the other hand, has suffered a decided decrease in point of value, and a small decrease in volume. In 1889 the output amounted to 1,812,000 ounces; in 1900 it was 1,578,000 ounces, value $1,074,000. The mining of both gold and silver was begun by the Spaniards. In addition to the metals mentioned above, lead and coal deposits are worked to some extent. Platinum, quicksilver, tin, nickel, iron, salt, gypsum, and such precious stones as the opal, garnet, onyx, and sapphire, as well as chalcedony and marble, are also found, although they are not as yet worked on any large scale.

Agriculture. Isolation and aridity have held Arizona in a backward state of development. Railroads and irrigation, however, are overcoming these obstacles. *Stock-raising* has been heretofore the leading agricultural industry, and the absence of climatic extremes, such as are common to the regions farther north, is very favorable to this industry. In 1900 the neat cattle in the Territory numbered 607,000; sheep, 668,000; horses, 106,000; the first of these doubled in number during the decade, while the two latter increased threefold. The pasture lands are confined principally to the northern plateau, the rainfall of the southern portion of the Territory being insufficient for the growth of grasses, except on a few favored mountain slopes.

With the development of irrigation, mixed farming is becoming common. The most favorable region for irrigation is the valley of the Gila River and its tributaries. The most extensive irrigated district is that surrounding the city of Phœnix. During the last decade of the century the irrigated land (outside of Indian reservations) increased from 65,000 to 185,000 acres. This constitutes 81 per cent. of the improved land of the Territory. The farm land aggregates but 2.7 per cent. of the total area. The rainfall is so small that the ordinary flow of water in the streams supplies but a small portion of the irrigable area, and the further extension of irrigation is dependent upon the construction of storage reservoirs. Alfalfa is the most important crop. The acreage devoted to its cultivation (including the reservations) increased during the decade 231.4 per cent. Wheat and barley are next in importance, and the acreage of these and other cereals is rapidly increasing. In the southern part of the Territory many of the semi-tropical fruits — figs, raisin-grapes, almonds, etc.—are successfully raised, ripening earlier than in any other part of the United States. Recent experiments seem to show that Egyptian cotton can be successfully grown in this region. The more distinctively temperate zone crops—potatoes, apples, and various kinds of fruits—flourish in the northern counties.

Manufactures. Manufactures within the limits of the Territory are confined largely to the building trades, to car construction and repair shops, and to the smelting and refining of copper.

Transportation. The lower course of the Colorado constitutes the only navigable waters of the Territory. The Southern Pacific, running across the southern end of the Territory, the Santa Fé Pacific across the northern end, and the Santa Fé, Prescott, and Phœnix connecting the two, are the principal railroads. The mileage has been steadily increasing, having risen from 349 miles in 1880 to 1094 miles in 1890, and to 1465 miles in 1899. There are 1.28 miles of line for every 100 square miles of territory, and 204 miles to every 10,000 inhabitants. The Territory has a larger mileage, in proportion to its inhabitants, than has any of the States.

Banks. In 1900, eight national banks had been organized in the Territory, only three of which were in operation. The capital stock amounted to $400,000; circulation outstanding, $213,000; and deposits, $2,061,000. On June 30, 1900, there were fourteen State banks, with total resources of $2,762,000; capital stock, $373,000; and deposits, $2,296,000.

Government. (See paragraph on *Government* under Territories). The total valuation of property in the Territory for the year 1900 was $33.732,465. The tax rate for the year was $0.55 per $100. Net indebtedness, $1,070,850.

Education. Arizona has been diligent in maintaining a high educational standard. Although the sparse population of the Territory is so widely scattered, public school advantages are brought within the reach of almost all. The education of all children is compulsory under the law: and in 1900, 79 per cent. of the 20,833 children between the ages of 6 and 18 were enrolled in the public schools. For a few years the average length of the school term has exceeded 125 days. There are two Territorial normal schools, one being located at Tempe, the other at Flagstaff. The Territorial university at Tucson includes courses in agriculture and in mining.

Charitable and Penal Institutions. The Territory has an insane asylum at Phœnix, and a prison at Yuma.

Religion. The Catholics were first in the field. As early as 1687 the Jesuits had established missions and schools in the Territory, and were always active in the propagation of their faith. This sect still constitutes a large percentage of the church membership of the Territory. In recent years the Territory has been colonized by Mormons, who now rank next to the Catholics in numbers. Nearly half of the population of the Territory are church members.

Population. The population of Arizona by decades is as follows: 1870, 9658; 1880, 40,440; 1890, 59,620; 1900, 122,931. Nevada, Wyoming, and Alaska are all behind Arizona in population. There are only 1.1 inhabitants per square mile. The foreign born constitute less than 20 per cent. of the population, and are mostly Mexican. The excess of males — a phenomenon common to the Western States—is marked, being more than 20,000; this is attributed to the mining and frontier character of the Territory. For the populations of Arizona by counties, see back of map. The following are the largest cities in the Territory: Tucson, 7531; Phœnix, 5544; Prescott, 3559; Jerome, 2861. Phœnix is the capital.

Indians. At the census of 1900 the Indians numbered 26,400, those taxed only 1836. This was a decrease of over 3000 during the decade. Twenty thousand one hundred belonged to the Navajo tribe. There are five agencies in the

Territory. The Indians were formerly very troublesome, but have now become law-abiding and industrious, taking an active interest in education and agriculture.

Militia. The organized militia numbers 500. The census of 1900 counted 34,200 males of militia age, of whom 12,000 are liable to duty.

History. Long before its discovery by white men, Arizona was inhabited by a powerful race, whose ruined cities, aqueducts, and fortifications dot the valleys and cañons of the Territory. In 1539 Fray Marcos de Niza, with a companion, left the City of Mexico to explore the country now included in Arizona and New Mexico, being stimulated by rumors of its mineral wealth and of its populous Seven Cities of Cibola. The report brought back was so favorable that in 1540 Vasquez de Coronado led an expedition thither, visiting the Moqui villages and New Mexican pueblos, and exploring, it is believed, as far north as latitude 40°. In Spanish and Mexican times there was no Arizona, and the country south of the Gila formed part of the Province of Pimeria Alta. What is now Arizona was very sparsely settled before the beginning of the Nineteenth Century. In 1772 there were only two missions in Arizona, with three *visitas*, and two incipient towns—Tucson and Tubac. The hostility of the Apaches and other tribes prevented all advance, and outbreaks in 1802 and 1827, added to the disorder attending the Mexican Revolution, led to the abandonment of the mines and ranches, and of all settlements, excepting Tucson and Tubac. By the Treaty of Guadalupe-Hidalgo (q.v.), February 2, 1848, Arizona, then included in New Mexico, became the property of the United States, except the tract south of the Gila, which was a part of the Mexican State of Sonora, and was not acquired till December 30, 1853. (See Gadsden Purchase.) On February 24, 1863, Arizona was separated from New Mexico and made a Territory. Indian troubles broke out as late as 1896, and tended in some degree to hinder the development of the country, but the population of the Territory has steadily increased in proportion as larger tracts of desert land have been reclaimed by irrigation, and the mineral resources of the region have been utilized. On December 1, 1891, a constitution was adopted by the people in anticipation of admission to the Union as a State, but Congress refused to grant the application.

The following is a list of governors who have served the Territory:

John N. Goodwin	Republican	1863–65
Richard C. McCormick	"	1865–69
A. P. K. Safford	"	1869–77
John P. Hoyt	"	1877–78
John C. Fremont	"	1878–81
John J. Gosper	"	1881–82
Frederick A. Tritle	"	1882–85
C. Meyer Zulick	Democrat	1885–89
Lewis Wolfley	Republican	1889–90
John N. Irwin	"	1890–92
Nathan B. Murphy	"	1892–93
Louis C. Hughes	Democrat	1893–96
Benjamin J. Franklin	Republican	1896–97
Myron H. McCord	"	1897–99
Nathan B. Murphy	"	1899—

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ARIZONA, University of. An American university situated at Tucson, Ariz. It was established by act of the Legislature in 1885, opened 1891, and had in 1901 buildings and grounds valued at $160,000; a library of 6000 volumes and 10,000 pamphlets; a faculty of 20; and 47 collegiate and 178 sub-collegiate students. It receives $40,000 annually from the United States Government and $15,000 (approximately) from the Territory. There is a full academic course, and a manual training and mining school equipment. President, M. M. Parker, A.M.

ARJISH, är-jēsh′, or Erjish Dagh (anciently, Lat. *Argæus*). An extinct volcano in Asia Minor, situated in the vilayet of Angora, south of Kaisarieh. It has an altitude of over 13,000 feet, and its latest eruption took place in the Fourth Century.

ARJISH, or Akhlat. A small town of Turkish Armenia, vilayet of Erzerum, on the northern shore of Lake Van (Map: Turkey in Asia, K 3). Population about 2000. The old city of Arjish, at a little distance from the present town, in a ravine, was the residence of the kings of Armenia, and was the scene of many conflicts between the Greeks, Armenians, and Persians. It was taken and devastated in 1228 by Jelal-ed-Din, and completely destroyed by an earthquake in 1246. Arjish is the seat of an Armenian bishop.

AR′JUNA, *Hind. pron.* ŭr′jōō-nä. The grandson of Indra, and the hero of episodes in the Māhabhārata.

ARK. In the English Version of the Bible the word is applied to three different objects: (1) To the craft which Noah built and in which he preserved himself, his family, and numerous animals alive during the flood. It is described in Gen. vi. It was of "gopher wood," which is perhaps conifer cypress, of which the Phœnicians built ships, and the "pitch" used was asphalt. Its dimensions were, in English measure: Length, 525 feet; breadth, 87½ feet; height, 52½ feet. It was not built for speed, and merely floated about until the waters subsided. (2) To the basket of bulrushes (papyrus reed) daubed with slime, prepared by the mother of Moses, in which Moses floated on the Nile until Pharaoh's daughter rescued him

(Exod. ii. 3 seq.). A similar story is told of Sargon I., a king in the Valley of the Euphrates about B.C. 3800. (3) To the Ark of the Covenant (q.v.).

AR′KADEL′PHIA. A city, the county-seat of Clark County, Ark., 65 miles southwest of Little Rock, on the Ouachita River, and Saint Louis, Iron Mountain and Southern Railroad (Map: Arkansas, C 3). Arkadelphia, 300 feet above sea-level, has good natural drainage and water power. Its manufactures comprise the products of lumber and cotton mills, and foundry and machine shops. It is the site of Ouachita Baptist College and Arkadelphia Methodist College, founded 1886 and 1890, respectively, and has Baptist and Presbyterian schools for colored pupils. The charter of Arkadelphia, in effect since 1873, provides for a biennially elected mayor and a city council. Population, in 1890, 2455; in 1900, 2739.

ARKANSAS, är′kan-sa̤ (popularly known as the 'Bear State'). A south central State of the United States, bounded by Missouri on the north, the Mississippi River (which separates it from Tennessee and Mississippi) on the east, Louisiana on the south, and the Indian Territory on the west, with Texas touching the southwest corner. It is nearly square in form, each side measuring about 250 miles, and covers an area of 53,850 square miles, of which 805 square miles are water. It ranks twenty-third in size among the States of the Union.

Topography. With the exception of a few high bluffs, the eastern margin of the State is subject to inundation from the Mississippi River, causing an overflowing of the numerous lakes, bayous, and swamps. But the region to the westward attains a higher elevation, and the surface is broken by numerous ranges of hills and low mountains, which have a general trend from east to west. The mountains in the northwest are a part of the Ozark uplift, being continuous with the elevations in the Indian Territory to the west and Missouri to the north. The highest points in the State do not exceed 2800 feet. The Arkansas River bisects the State from northwest to southeast and joins the Mississippi. The White River enters the State from southwestern Missouri, flows southeast, receives the Black and Cache Rivers from the north and joins the Arkansas near its mouth. The Ouachita, Saline, and Bartholomew, tributaries of the Red River, drain the southern part of the State. The Arkansas is navigable for boats of light draught throughout its course within the State; the White for 260 miles; the Ouachita and Bartholomew each for 150 miles; the Saline, Red, and Black each for 100 miles, making a total of some 3000 miles of waterways within the State. The upper courses of the streams furnish water power.

Climate and Soil. Except in the eastern swampy districts, where malaria and other fevers are common, the climate is pleasant and healthful. The snowfall is light, and prolonged droughts are unknown. The mean rainfall for the State is 50.6 inches; at Fort Smith, 46.5 inches; at Hot Springs in the southwestern part, 63.2 inches; at Little Rock, 52.3 inches. Mean temperatures for January and July respectively are as follows: At Little Rock (central), 40.8 and 80.3 degrees; at Fort Smith (northwest), 36.1 and 80.0 degrees. The hill country of the northern part of the State has little land of agricultural value, the soil being sandy and thin; but the bottom lands, having a heavy black soil, are very productive. In the limestone regions are found much red clay and loam, the residual materials from the decomposition of the limestone. The higher lands of the Arkansas Valley, from Indian Territory to Little Rock, are composed of a dark, sandy loam. Below Little Rock a sandy, sometimes clayey, soil borders the river, and this grades toward the south into black, sandy, and 'buckshot' soils, which are the richest in the State, and which yield from 2000 to 3000 pounds of seed cotton to the acre. The bottom lands of the Red River Valley contain a black, sandy loam or a red, sticky clay called "gumbo." A yellow loam is characteristic of some of the southern counties, which are underlaid by deposits of the Tertiary Age.

Geology and Mineral Resources. A northeast line drawn from Texarkana in the southwestern corner, through Little Rock to Pocahontas in the northeast, divides the State into two parts; the northwest portion is underlain by Paleozoic rocks with a small area of Cretaceous rocks in its southernmost corner; the southeastern portion is occupied by the less consolidated rocks of Tertiary and Post-Tertiary Ages. The Paleozoic area is essentially the 'hill country;' the Tertiary district is a part of the low level, fertile Atlantic coastal plain. The oldest rocks known in the State are of the Ordovician or Lower Silurian Age. They extend over the line from Missouri and lie on the southern flanks of the Ozark uplift, and consist of sandstones, quartzites, and limestones, the latter in the upper part of the series. They furnish good building stones, quartz sand for glassmaking, and lime. Along the southern boundary of the Ordovician formations, in the vicinity of Batesville and Cushman in Independence and Izard counties, are deposits of manganese ore which are worked to some extent, the product being shipped to steel manufacturers in the East. Another area of Ordovician rocks is found in the Ouachita Mountains west of Little Rock. In these mountains are large masses of a silicious rock, novaculite, from which are made the finest known whetstones, called in the markets "Arkansas" and "Ouachita" stones.

These whetstones are obtained in Garland, Howard, Hot Springs, Montgomery, Polk, Pulaski, and Saline counties, and their quarrying constitutes an important industry. In connection with the Ordovician rocks of the Ouachita uplift are found some deposits of manganese ore, but these are of little importance compared with those of the Batesville region. Around the edges of the Ordovician area of the northern part of the State is a narrow strip of Silurian limestone, the Saint Clair limestone, that furnishes a fine quality of pink marble useful for ornamental purposes. The Devonian formation is poorly developed. It is known as the Eureka shale and the Sylamore sandstone, but is of importance for the reason that in connection with it are found phosphate deposits which give promise of yielding valuable returns. Gold and silver have been reported in large quantities in the Ouachita Mountains, but examinations made by the State geologist have proven the reports to be erroneous or misleading, and the amount of these precious metals to be very small. Deposits of zinc blende have been opened recently in Sevier County, and other occurrences of this ore, as well as of galena, are known in the northwestern part of the State. Aluminium ore in the form of bauxite occurs near Little Rock and farther west at Bryant in Salina County. Iron ores are of little importance, though they are found, at many places, in the form of limonite. Nickel is also known, but sparingly, in Salina County. The coal measures cover large areas and furnish a good quality of bituminous coal in abundance. Oil and gas have been found only in small amount. In the Cretaceous and Tertiary areas no metals have been found, but there are deposits of lignite and greensand.

Igneous rocks of great geologic interest are found at Magnet Cove and Fourche Mountain, in the eastern end of the novaculite region near Hot Springs. No Pre-Cambrian rocks* are known in the State. Mineral springs are common, especially so in the Ouachita Mountains. Those at Hot Springs are famous for their medicinal qualities, and have led to the foundation there of a renowned health resort. The Ouachita Mountains have been shown to be the westerly extension of the south end of the Appalachian mountain system, and to have been formed at the same time and by the same causes that upheaved the Appalachians.

Mining. The lack of transportation facilities and of adequate geological surveys has delayed the development of the mineral resources of the State. Mining in some directions, however, is steadily growing. The output of coal (bituminous) has increased in value from $200,000 in 1886 to $1,687,000 in 1900. Granite, sandstone, limestone, and slate are quarried, and building clay is obtained. Whetstones of superior grade have been quarried since 1840. Some cement is manufactured, and small quantities of zinc ore and bauxite are exported.

Agriculture. Few States are so exclusively agricultural as Arkansas. It shared with the other Southern States the disasters of the Civil War, but not to so great a degree. It was new and comparatively undeveloped at that time, and it soon regained and rapidly exceeded its former importance. In 1860 the farm acreage was only a little more than one-fourth of the total area of the State; in 1900 it was 49 per cent. During the decade 1890-1900 the farm acreage increased by 1,755,000 acres. In 1860 but 20.7 per cent. of the farm land was improved, while in 1900, 41.8 per cent. of it was improved. There has been during the period mentioned a rapid increase in the number of farms and a decrease in their size. The average size in 1860 was 245.5 acres; in 1900 it was 93.1 acres. The farms in the cotton belt average a little smaller than in other parts of the State. In three counties in that section the number of farms doubled during the last census period, and in others the increase was almost as marked. The farms are there cultivated largely by negroes, who constitute about 26 per cent. of the total number of farmers (80 per cent. in two counties), but the acreage cultivated by them is only 13.8 per cent. of the total. Of the white farmers, 56.3 own their farms; of the colored farmers only 21.2 per cent.

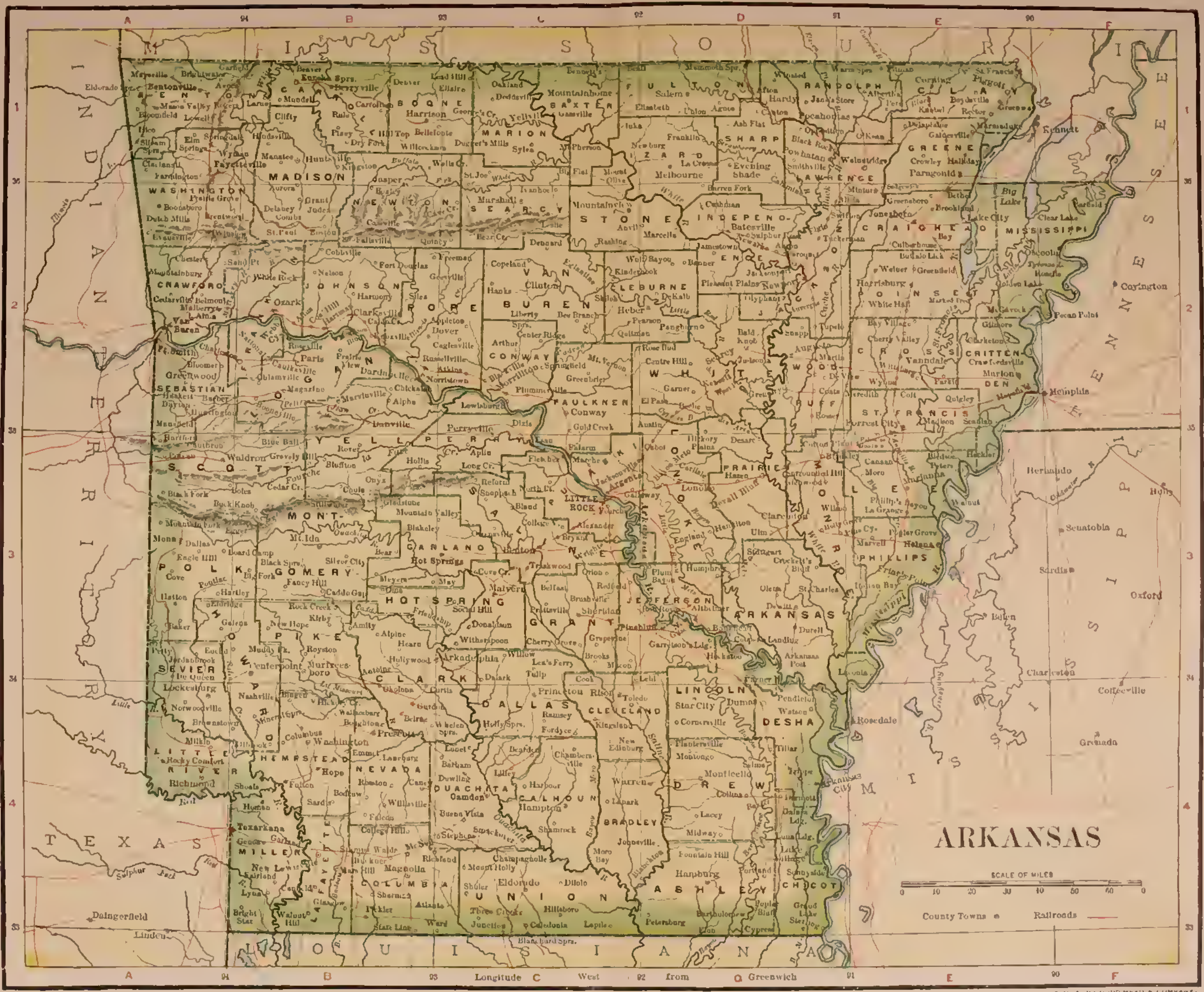
As already mentioned, there are two agricultural sections in the State. The region north and west of a line drawn from near the northeastern corner of the State to Little Rock and thence west to the boundary is known as the upland region, containing much hilly and mountainous territory, resembling the Missouri region to the north; while the southern division, consisting largely of low ground and an alluvial soil—much of it requiring drainage and some of it subject to annual overflow—resembles the Louisiana region to the south. The cereals and temperate zone crops predominate in the northern division; while cotton and representative southern crops predominate in the other. The cotton product of the State yields nearly half of the total crop receipts, though the acreage is less than one-third of the total cultivated area. In 1900, 819,000 bales of cotton were marketed, giving the State fifth rank among the cotton-growing commonwealths. Corn, wheat, and oats are the most important of the cereals. Hay and forage crops are also of considerable value. Peas are raised in the southwest; Irish potatoes in the northwest; and sweet potatoes throughout the State. Sorghum cane is produced, but in less quantities than formerly. The northwestern part of the State has acquired an enviable reputation in the production of fruits. The number of apple trees increased from 2,114,000 in 1890 to 7,434,000 in 1900. The peach trees exceed 4,000,000. In 1900 there were 9600 acres of strawberries. A minor local industry is the cultivation of roses and other flowers for the making of perfumes and for seeds. As in most other cotton-growing States, *stock-raising* is on a small scale. Horses, mules, and asses are necessary to the agriculturist, and their numbers are increasing rapidly. The raising of swine is extensive and increasing; but the last census showed a decrease in the number of dairy cows, neat cattle, and sheep. There was, however, a large increase in dairy products. The figures for farm animals, and also for crops, will be found in the following table:

Years.	Horses.	Mules and Asses.	Milch Cows.	Other Cattle.	Swine.	Sheep.
1900	253,500	177,400	312,500	581,900	1,713,300	168,700
1890	186,800	126,400	330,100	662,500	1,505,200	243,900
	Corn.	Oats.	Wheat.	Hay, tons.	Cotton, bales.	Potatoes.
1900	2,317,700	280,100	379,400	239,400	1,641,800	39,700
1890	1,648,400	288,300	140,400	138,200	1,700,500	33,800

Manufactures. But little manufacturing is carried on in the State, the census of 1900 showing only 2 per cent. of the population engaged in that industry, yet the wage-earners (26,500 in 1900) have almost doubled in number during the last decade, and the capital invested has more than doubled. The value of manufactured products of the State has also doubled, rising from $22,700,000 in 1890 to $44,900,000 in 1900. The greatest increase was in the manufacture of lumber and timber products, and the vast forest resources of the State promise a bright future in this particular industry. The forest area exceeds 25,000,000 acres—an area larger than that of the State of Indiana. There are varieties both of hard and soft wood. The number of establishments manufacturing lumber and timber products increased, during the decade ending 1900, from 539 to 1199; and the wage-earners in that industry from 6563 to 15,895. Prominent among forest products are sash, doors, and blinds, cedar posts, cypress shingles, staves, and spokes.

AREA AND POPULATION OF ARKANSAS BY COUNTIES.

County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
Arkansas	D 3	Dewitt	1,013	11,432	12,973
Ashley	D 4	Hamburg	974	13,295	19,734
Baxter	C 1	Mountainhome	564	8,527	9,298
Benton	A 1	Bentonville	892	27,716	31.611
Boone	B 1	Harrison	631	15,816	16,396
Bradley	C 4	Warren	658	7,972	9.651
Calhoun	C 4	Hampton	646	7,267	8,539
Carroll	B 1	Berryville	645	17,288	18,848
Chicot	D 4	Lake Village	616	11,419	14,528
Clark	B 3	Arkadelphia	875	20,997	21,289
Clay	E 1	Corning	649	12.200	15,886
Cleburne	C 2	Heber	635	7,884	9,628
Cleveland	C 4	Rison	581	11,362	11,620
Columbia	B 4	Magnolia	846	19,893	22,077
Conway	C 2	Morrillton	489	19,459	19,772
Craighead	E 2	Jonesboro	683	12,025	19,506
Crawford	A 2	Vanburen	609	21,714	21,270
Crittenden	E 2	Marion	623	13,940	14,529
Cross	E 2	Vanndale	629	7,693	11,051
Dallas	C 4	Princeton	657	9,296	11,518
Desha	D 4	Arkansas City	725	10,324	11,511
Drew	D 4	Monticello	838	17,352	19,451
Faulkner	C 2	Conway	661	18,342	20,780
Franklin	B 2	Ozark	637	19,934	17,395
Fulton	D 1	Salem	622	10,984	12,917
Garland	B 3	Hot Springs	652	15,328	18,773
Grant	C 3	Sheridan	640	7.786	7,671
Greene	E 1	Paragould	544	12,908	16,979
Hempstead	B 4	Washington	722	22,796	24,101
Hot Springs	B 3	Malvern	631	11,603	12,748
Howard	A 3	Centerpoint	611	13,789	14,076
Independence	D 2	Batesville	779	21,961	22,557
Izard	D 1	Melbourne	611	13,038	13,506
Jackson	D 2	Newport	643	15,179	18,383
Jefferson	D 3	Pine Bluff	919	40,881	40,972
Johnson	B 2	Clarksville	666	16,758	17,448
Lafayette	B 4	New Lewisville	524	7,700	10,594
Lawrence	D 1	Powhatan	589	12,984	16.491
Lee	E 3	Marianna	595	18,886	19,409
Lincoln	D 4	Star City	560	10,255	13,389
Little River	A 4	Richmond	556	8,903	13,731
Logan	B 2	Paris	697	20.774	20,563
Lonoke	D 3	Lonoke	784	19,263	22,544
Madison	B 1	Huntsville	859	17.402	19,864
Marion	C 1	Yellville	628	10,390	11,377
Miller	B 4	Texarkana	665	14.714	17,558
Mississippi	E 2	Osceola	842	11,635	16,384
Monroe	D 3	Clarendon	622	15,336	16,816
Montgomery	B 3	Mount Ida	918	7,923	9,414
Nevada	B 4	Prescott	610	14,832	16,609
Newton	B 3	Jasper	838	9,950	12,538
Ouachita	C 4	Camden	742	17,033	20,892
Perry	C 2	Perryville	608	5,538	7,294
Phillips	E 3	Helena	710	25,341	26,561
Pike	B 3	Murfreesboro	611	8,537	10,301
Poinsett	E 2	Harrisburg	727	4,272	7,025
Polk	A 3	Mena	868	9,283	18,352
Pope	B 2	Russellville	834	19,458	21,715
Prairie	D 3	Desarc	675	11,374	11,875
Pulaski	C 3	Little Rock	788	47,329	63,179
Randolph	D 1	Pocahontas	644	14,485	17,156
St. Francis	E 2	Forrest City	646	13.543	17,157
Saline	C 3	Benton	750	11,311	13,122
Scott	A 3	Waldron	1,030	12,635	13,183
Searcy	C 2	Marshall	652	9,664	11,988
Sebastian	A 2	Greenwood	542	33,200	36,935
Sevier	A 3	Locksburg	548	10,072	16,339
Sharp	D 1	Evening Shade	606	10,418	12,199
Stone	C 2	Mountainview	615	7,043	8,100
Union	C 4	Eldorado	1,074	14,977	22,495
Van Buren	C 2	Clinton	684	8,567	11,220
Washington	A 2	Fayetteville	1,005	32,024	34,256
White	D 2	Searcy	1,035	22,946	24,864
Woodruff	D 2	Augusta	593	14,009	16,304
Yell	B 3	Danville	955	18,015	22,750



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The value of the forest product for 1900 was estimated at $26,000,000. As a natural outgrowth of the vast cotton interests of the State, there have developed such branches of manufacturing as cotton-seed oil and cake pressing, and cotton ginning. Spinning and weaving, however, have made no progress. Flour and grist-mills are important, but not participating in the rapid development of the other industries. The following table shows the progress of the leading industries:

INDUSTRIES.	Year.	Number of establishments.	Av'ge number wage earners	Value of products, including custom work and repairing.
Total industries..........	1900	3,067	21,717	$37,006,409
	1890	1,250	10,384	17,275,192
Increase, 1890 to 1900......	......	1,817	11,333	19,731,217
Per cent. of increase.......	......	145.4	109.1	114.2
Per cent. total industries	1900	64.0	81.9	82.4
	1890	60.3	73.4	76.2
Lumber and timber products........................	1900	1,199	15,895	23,959,983
	1890	539	6,563	8,943,052
Planing mill p'd'ct, sash, doors, and blinds, incl.	1900	50	1,082	2,266,522
	1890	38	640	1,761,932
Oil, cottonseed and cake	1900	20	667	2,874,864
	1890	8	511	1,881,668
Cotton ginning*............	1900	1,150	1,103	1,261,097
	1890	137	569	153,226
Flouring and grist-mill products......................	1900	410	443	3,708,709
	1890	376	742	2,498,168
Steam-car construction and repair shops.........	1900	21	1,927	2,095,447
	1890	8	847	1,299,558
Printing and publishing.	1900	217	600	839,787
	1890	144	512	737,588

*Does not include many ginneries operated in connection with saw, grist, and cotton-seed oil mills, or for the use exclusively of plantations on which they are located.

TRANSPORTATION AND COMMERCE. The Mississippi River gives the State a water outlet to the Atlantic, and a water communication with the other Mississippi Valley States. Besides this, the Arkansas, and a large number of smaller streams traversing the State, afford navigable waterways. The very multiplicity of these, together with the broken mountainous nature of the western and northern portions of the State, have greatly retarded the development of an adequate railroad system. At present, however, railroad construction is making rapid progress. The first railroad in the State was not completed when the Civil War broke out in 1861, and there were but 859 miles in 1880. In 1890 the mileage had increased to 2203; in 1900 to 3167. There are altogether 39 railway lines, of which the principal are the Saint Louis, Iron Mountain and Southern; the Saint Louis Southwestern, and the Choctaw, Oklahoma and Gulf. There are about 6 miles of line to every 100 square miles of territory, and about 24 miles to every 10,000 inhabitants. A State Railroad Commission has been recently created, which examines and revises the rate sheets of the railways, and fixes rates for such roads as may fail to furnish rate sheets. The foreign commerce is carried on largely through the port of New Orleans, and consists chiefly of cotton and lumber.

BANKS. In 1900, fourteen national banks had been organized in the State, seven of which were in operation. The capital stock aggregated $1,070,000; the circulation outstanding, $330,000; the deposits, $3,108,000; and the reserve, $1,003,000. In addition to this, there were thirty-nine State banks, having resources amounting to $6,604,000; capital stock, $1,243,000; and deposits, $4,464,000. There were, besides, a few small private banks.

FINANCES. About 1880 there arose a dispute between the State of Arkansas and the United States. The latter held certain coupon bonds of the State, which the State asserted the right to offset by an unliquidated claim which had arisen through failure of the Government to patent to the State some 273,000 acres of swamp lands. After a prolonged discussion, the matter was settled finally in 1900. Arkansas relinquished claim to the lands, guaranteeing the titles to the settlers, while paying to the Government $160,572. The debt of the State in January, 1901, was $1,271,000, of which sum $1,113,000 was a part of the permanent school fund.

EDUCATION. Arkansas, like the other Southern States, has labored in the face of very unfavorable conditions for the establishment of adequate schools. There is a very large and widely scattered rural population, and the experience of every State bears testimony to the difficulty of the solution of the rural educational problem. The average length of the school term (about 70 days) is less than that of any other State, with one or two possible exceptions. Of a school population of 349,000 whites (1900), 230,000 were enrolled and 142,000 were in average attendance; while of 135,000 blacks, 84,000 were enrolled, and 52,000 were in average attendance. Of the total school population 65 per cent. were enrolled, and 62 per cent. of these were in average attendance. The excellence of the schools varies with the community, each being dependent almost wholly upon itself for financial support. The school interests are in the hands of local school directors. The State has a permanent school fund of $1,118,709. The interest on this, together with the amounts arising from the 2 mills State school tax and other sources, aggregates nearly $500,000 annually, and constitutes the common school fund, which is apportioned among the various counties. The district tax in 1900 amounted to $805,000 and the poll tax to $163,000; making a total school revenue of nearly $1,500,000 as against an expenditure of $1,369,000. Of the 6959 teachers employed, 4152 are males, a larger proportion than in any other State. There are twenty-four secondary schools in the State. A State University is situated at Fayetteville. There are no State normal schools, but private enterprise has provided several answering their purpose. Private and sectarian interests also maintain several small colleges, six of which are for the education of the colored race.

CHARITABLE AND PENAL INSTITUTIONS. The State maintains a lunatic asylum, but it is inadequate to meet the public needs. There are also a deaf-mute institution and a penitentiary now located in Pulaski County. There is no reform school, and juvenile offenders are confined in the county jails and the State penitentiary.

RELIGION. As is common in the Southern States, the Baptist and Methodist churches contain the bulk of the church membership. Of the other churches represented, the Presbyterian and the Christian are the only ones that have obtained any considerable following.

POPULATION. The population by decades is as follows: 1820, 14,000; 1830, 30,000; 1840, 97,000; 1850, 209,000; 1860, 435,000; 1870, 484,000; 1880, 802,000; 1890, 1,128,000; 1900, 1,311,000. In 1820 Arkansas ranked twenty-sixth in order of population, and has since varied but little from this position, being twenty-fifth in 1900. The State ranks tenth in respect to negro population, the rate of increase for this class being greater than it is for the whites. In 1880 they numbered 210,000; in 1890, 309,000; and in 1900, 366,000. The rate of increase for the whole population during the last decade was 16.3, as against 20.7 for the United States. There are 24.7 people to the square mile, the density being a little less than that of the United States. As in other Southern States, foreign immigration has been unimportant, the total number of immigrants in 1900 being but 14,289. The excess of males in the population is 39,000. The State is in striking contrast with the nation as a whole, in the relative proportions of the rural and urban population. But eight places exceed 4000 in number of inhabitants, and contain but 6.9 of the total population. *Cities.*—In 1900, Little Rock, the capital, had a population of 38,307; Pine Bluff, 11,147; Fort Smith, 10,903; Hot Springs, 9412. The State has seven representatives in Congress. For population of the State by counties, see the back of the map.

GOVERNMENT. The present constitution, which is the third for the State, was adopted by a vote of the people in 1874. Either House may propose an amendment to the constitution, which, if approved by a majority of both houses and by a majority of the voters at the next general election, is adopted. To enjoy the right of suffrage one must have resided in the State one year, in the county six months, and in the precinct or ward one month, while an amendment passed in 1893 further restricts the suffrage to those who have paid a poll tax. Elections are held every two years, on the first Monday in September. Some further provisions of the constitution are: "No person who denies the being of a God shall hold any office in the civil departments of this State, nor be competent to testify as a witness in any court." Six per cent. is the legal rate of interest, and all contracts for a greater rate than 10 per cent. are void, both principal and interest being forfeited. The property of the wife is not liable for the debts of her husband. The principal causes for divorce are adultery, habitual drunkenness, cruel treatment, or desertion for one year.

Legislative.—The representatives to the State Legislature are elected for a term of two years, and cannot exceed 100 in number, each county being entitled to one member, while the extra members are distributed among the more populous counties. Thirty and thirty-five are respectively the minimum and maximum limits to the number of senators, who are elected from districts of contiguous counties, serving for four years. The session of the legislature is limited to sixty days, unless extended by a two-thirds vote of each House. The governor may call an extra session.

Executive.—The governor, secretary of state, treasurer, auditor, and attorney-general are each elected for a term of two years. The governor's veto may be overridden by a majority vote of each House. If the office of governor becomes vacant twelve months before the expiration of the term, a new election is held to fill the vacancy—if the vacancy occurs within that period, the president of the Senate completes the term.

Judiciary.—There is a supreme court of five members, each elected for eight years; a number of circuit courts, each member of which is elected for four years; a probate and county court for each county; and at least two justices of the peace for each township—the justices of the peace and county judges being elected for terms of two years. The General Assembly also vests such jurisdiction as may be deemed necessary in municipal corporation courts, courts of common pleas, where established, and when deemed expedient, and establishes separate courts of chancery.

Local Government.—Each county has a sheriff, assessor, coroner, treasurer, and surveyor, each elected for two years. Each township has a constable, who is elected for two years. The Legislature may create other local offices. The county court, together with a majority of the justices of the peace, levies road taxes when the people have voted in favor of such a measure. The Legislature provides, by general laws, for the organization of cities (which may be classified) and incorporated towns, and can place certain restrictions upon them.

Militia.—The organized militia has a total strength of 1900, 1600 of whom belong to the infantry. The only limitation to the extent of organization is that there shall not be more than four companies in any one county. The census of 1900 reported 250,000 males of militia age within the State.

HISTORY. The name Arkansas (pronounced Ar'kansaw) was that of an Indian tribe found by the first explorers within the limits of the present State. About 1685, Frenchmen settled at Arkansas Post. Arkansas formed a part of Louisiana Territory till 1812, and of Missouri Territory till 1819, when it was organized as Arkansas Territory, including Indian Territory. On June 15, 1836, it became a State. Though settled chiefly from the South, Arkansas was fairly divided between Unionists and Secessionists in the early part of 1861; but President Lincoln's call for troops led to the passing of an ordinance of secession on May 6, 1861. The Confederates were defeated at Pea Ridge, March 6-7, 1862, and at Prairie Grove, December 7. Helena was occupied by Union forces, and Arkansas Post was captured on January 11, 1863. With the fall of Little Rock, September 10, 1863, the Confederate power in the State collapsed. In October and November Union delegates from twenty counties met at Fort Smith to take steps to reorganize the State Government, and in January, 1864, a convention met at Little Rock and framed a constitution, which was accepted by the people, but rejected by Congress. Under the Reconstruction Act of 1867, a constitutional convention met January 7, 1868, at Little Rock, and framed a constitution, which was ratified March 13, by a small majority. On June 22 the State was readmitted to the Union. In April, 1874, an armed collision occurred between the adherents of two rival claimants for the governorship. Federal aid was invoked, and President Grant formally recognized Baxter, Republican, as the lawful governor. In 1874 a new constitution was adopted. It marked a radical change in the existing law and was in the main a return to ante-bellum conditions. Of recent years the prosperity of the State has increased with the development of its rich mineral resources. Since 1876 the Democrats have been victorious in State and national elections; the congressional delegation as a rule is solidly Democratic. The electoral vote has been cast as follows: in 1836 and 1840, for Van Buren and Johnson, 3; 1844, Polk and Dallas, 3; 1848, Cass and Butler, 3; 1852, Pierce and King, 4; 1856, Buchanan and Breckenridge, 4; 1860, Breckenridge and Lane, 4; 1864, no vote; 1868, Grant and Colfax, 5; 1872, 6 votes not counted; 1876, Tilden and Hendricks, 6; 1880, Hancock and English, 6; 1884, Cleveland and Hendricks, 7; 1888, Cleveland and Thurman, 7; 1892, Cleveland and Stevenson, 8; 1896, Bryan and Sewall, 8; 1900, Bryan and Stevenson, 8.

The following is a list of the governors of Arkansas from the date of its organization as a Territory:

TERRITORIAL GOVERNORS.

James Miller	1819–25
George Izard	1825–29
John Pope	1829–35
William S. Fulton	1835–36

STATE GOVERNORS.

James S. Conway	Democrat	1836–40
Archibald Yell	"	1840–44
Samuel Adams	"	1844
Thomas S. Drew	"	1844–48
John S. Roane	"	1848–52
Elias N. Conway	"	1852–60
Henry M. Rector	"	1860–62
Harris Flanagan	"	1862–64
Isaac Murphy	Republican	1864–68
Powell Clayton	"	1868–71
Ozro A. Hadley	"	1871–72
Elisha Baxter	"	1872–74
Augustus H. Garland	Democrat	1874–77
Wm. R. Miller	"	1877–81
Thomas J. Churchill	"	1881–83
James H. Berry	"	1883–85
Simon P. Hughes	"	1885–89
James P. Eagle	"	1889–93
William M. Fishback	"	1893–95
James P. Clarke	"	1895–97
Daniel W. Jones	"	1897–01
Jefferson Davis	"	1901—

Bibliography. *Agricultural Experiment Station Bulletins* (Fayetteville, 1896, et seq.); *Arkansas Climate and Crop Service Monthly Reports* (Little Rock, 1896-1900); *Arkansas Common School Commissioner Report* (Little Rock, 1857); *Arkansas Department Biennial Report of the Secretary* (Little Rock, 1882-1898); *Arkansas State Lands, Commission of, Biennial Report for 1876-78* (Little Rock, 1878); *Arkansas Levee and Railroad Construction Bonds Committee, Report of Special Committee of House of Representatives* (Little Rock, 1873); Harvey, *Minerals and Rocks of Arkansas*, Catalogue of species (Philadelphia, 1886); Lewis, *Natural Resources of Arkansas* (Little Rock, 1869); Hillyard, *The New South* (Baltimore, 1887); Monette, *Discovery and Settlement of the Valley of the Mississippi* (New York, 1846).

ARKANSAS, University of. A State institution, situated at Fayetteville, Ark. It was founded in 1872, and has a medical and a law school at Little Rock, Ark., and a branch normal college at Pine Bluff. It is supported by the aid of the Federal and State endowments and appropriations, and has an income of about $70,000, grounds and buildings valued at $300,000, and a library of about 10,000 volumes. In 1901 there were 37 professors and instructors and 1150 students, distributed in the several departments as follows: Collegiate, 302; medical, 240; preparatory, 340; law, 21; normal training, 247. President, John L. Buchanan, A.M., LL.D.

ARKANSAS CIT′Y. A city in Cowley Co., Kan., 55 miles south by east of Wichita; on the Atchison, Topeka, and Santa Fé, the Missouri Pacific, the St. Louis and San Francisco, and other railroads (Map: Kansas, F 4). It is near the confluence of the Arkansas and Walnut rivers, which are connected by a canal which furnishes water-power for manufacturing. The city is the centre of a highly productive agricultural and stock-raising country; manufactures, flour, lumber, windmills, mattresses, ice, yeast, carriages, and creamery products; and from its location near the southern boundary of Kansas, has an important trade with the Indian agencies and military posts in Indian Territory and Oklahoma. The principal features of interest are the United States Indian School, the high-school and opera-house buildings, two parks, with several bridges across the canal and the Arkansas and Walnut rivers. Settled in 1870, Arkansas City was incorporated the following year. It is governed under a revised charter of 1880, which provides for a mayor, biennially elected, and a city council. The water-works are owned and operated by the municipality. Population, in 1890, 8347; in 1900, 6140.

ARKANSAS RIV′ER. Next to the Missouri, the largest affluent of the Mississippi River (Map: United States, Eastern Part, G 3). It rises in Central Colorado, flows east into Kansas, and out again east of the middle of the south boundary of the same State, southeast across Oklahoma and Indian Territories, and diagonally across Arkansas, bisecting it into nearly equal parts, and emptying into the Mississippi. The river is about 2000 miles long, navigable for 650 miles, and drains an area of 188,000 square miles. Much of the water in its upper course is used for irrigation purposes. In Fremont County, in Central Colorado, it flows through the Royal Gorge, one of the deepest cañons in the United States. In its upper course the current is very rapid, but in its lower portion the bed is sandy and broad. It receives the Salt Fork and Cimarron from the west in Oklahoma, and in the Indian Territory the Canadian from the west and the Verdigris and Grand rivers from the north.

ARKANSAS STONE. See Novaculite.

ARK′LOW. A small seaport town of County Wicklow, Ireland, about 50 miles south of Dublin (Map: Ireland E 4). Near the town is Shelton Abey, the seat of the Earl of Wicklow. In the uprising of 1798 the Irish were defeated here by the British. The population, mainly engaged in fishing, is gradually decreasing. In 1871 it was 5178; in 1891, 4172.

ARK OF THE COV′ENANT, Ark of the Testimony, Ark of Yahweh (or Jehovah), or Ark of God. According to the data furnished in the Bible, this was one of the most important parts of the furniture of the tabernacle constructed in the Wilderness, and afterwards of the temple built by Solomon at Jerusalem. We have two descriptions of it in the Pentateuch, Exod. xxv. 10-22 and xxvii. 1-9, both passages belonging to the Priestly Document.

From these descriptions, it appears that the ark was a chest of shittim-wood (very generally supposed to be the wood of a species of acacia, but by some regarded as that of the wild olive), overlaid with gold within and without, two cubits and a half in length, one cubit and a half in breadth and in height, with a crown or raised border of gold round about. Within the ark was deposited the "testimony," consisting of "the two tables of the Law"—i.e., the stone tablets upon which the Ten Commandments were inscribed (Exod. xl. 20). The golden lid of the ark was called the *mercy-seat* or *propitiatory;* above it were the *cherubim* (see CHERUB), made of the same piece of gold with it, and between them the place of the *Shechinah* or manifestation of the Divine Presence. It should, however, be mentioned that neither in Deuteronomy nor in the Books of Kings are these figures of the cherubim mentioned. The ark had golden rings, through which passed staves of shittim-wood, overlaid with gold, for carrying it in the journeyings of the Israelites, concerning which very particular rules were laid down (Num. iv.). While being carried from one place to another, it was covered first with a "covering of badgers' skins," and above this with a "cloth wholly of blue"; and when reposing in the tabernacle and temple it was put into the "most holy place," into which the high-priest alone was to enter upon the Day of Atonement. After the tabernacle had been set up at Shiloh, the ark was deposited there (Josh. xviii. 1). When Israel sustained defeat at the hands of the Philistines at Eben-ezer they sent to Shiloh for the ark (1 Sam. iv. 3-5). In the battle which followed, the Philistines captured the ark; they carried it about to several places in their land, but in each place misfortune followed its arrival, and at the advice of their diviners the Philistines returned the ark to Israel at Beth-Shemesh, whence it was removed to Kirjath-Jearim (I Sam. iv. 11-vii. 2); hence David removed it to Jerusalem (2 Sam. vi. 1), and Solomon assigned it a place in the Temple (1 Kings viii. 6). What finally became of the ark is unknown; perhaps it was captured in Nebuchadnezzar's siege of Jerusalem. At any rate there was no ark in the Second Temple (Josephus, *B. J.* v. 5. 5).

It is not easy, from the various accounts of, and references to, the ark in the Old Testament to obtain a clear idea of what the ark actually was, or what was its age. From Egyptian and Babylonian sources, we know that it was customary to carry the images of the gods about in portable shrines; and if, therefore, the Ark of the Covenant belongs to the oldest period of Hebrew history, it must have served as the abode of the Deity, suitable for a time when there was as yet no fixed sanctuary regarded as the seat of Yahweh. This view accords both with the statement (Num. x. 35, 36) that the ark was carried into battle (for among other nations it was customary to carry images and symbols of the gods into battle), and with the narrative in the Book of Samuel, from which it appears that where the ark rested, there Yahweh himself was supposed to have his abode for the time being. Whether, however, the description given of the ark in the Priestly Document applies to the earlier periods of Hebrew history is more than doubtful; it is probably a description of the ark as it appeared in the days of Solomon, and for which, as an ancient *palladium* to which the people were attached, a place was found in the Temple. As to the original contents of the ark, it is now held by many critics that the Hebrews at one time had a stone as a symbol of their God, and that the traditional tables of stone belong to a later period, when the fetich was replaced by a symbol that accorded better with the more advanced religious conceptions.

ARKO'NA. The northeast promontory of the German island of Rügen (q.v.), in the Baltic (Map: Prussia, E 1). It rises about 145 feet above the sea, and has a lighthouse, erected in 1826.

ARKOSE, är-kōs'. See SANDSTONE.

ARK SHELL, or NOAH'S ARK. A marine bivalve mollusk, common along the eastern coast of the United States, and representing the cosmopolitan family Arcadæ. The shells do not exceed three inches in length, are ventricose, hairy, and have the hinge margin long and perfectly straight. As the umbones are wide apart, this leaves a sort of flat "deck," which probably led Linnæus to the rather fanciful designation. They dwell near shore, especially where weedy rocks abound, but one species is known in the inland fresh waters of India. The commonest American species is Arca pexata (called "bloody clam," on account of its red gills and exudations), which is covered with coarse hairs. See Plate of ABALONE, ETC.

The genus Arca has existed for a great length of time, its ancestors being found in the rocks of all geological periods since the Ordovician, but in special abundance in the Tertiary deposits of all countries.

ARK'WRIGHT, Sir RICHARD (1732-92). Celebrated for his invention of cotton-spinning machinery, was born at Preston, in Lancashire. Of humble origin, the youngest of thirteen children, and bred to the trade of a barber, his early opportunities of cultivation were exceedingly limited. In 1761 he gave up his business as a barber in Bolton, to become a traveling dealer in hair, and the profits of his trade were increased considerably by a secret process for dyeing hair which he had acquired. His residence in the midst of a cotton-spinning population naturally led him to take an interest in the processes used in that manufacture, and his mind was soon turned toward improved methods. Having no practical skill in mechanics, he secured the services of a watchmaker, named Kay, to assist him in the construction of his apparatus. About 1767 he seems to have given himself wholly up to inventions in cotton-spinning machinery. In the following year he removed to Preston, where he set up his first machine, the celebrated *spinning-frame*, consisting chiefly of two pairs of rollers, the first pair, which were in contact, revolving with a slow motion, and passing the cotton to the other pair, which revolved with such increased velocity as to draw out the thread to the required degree of fineness. A subsequent operation was to spin the yarn from these threads. No previously invented machinery had been able to produce cotton thread of sufficient tenuity and strength to be used as warp. An invention, indeed, by Charles Wyatt of Birmingham, which was patented in 1738, but never succeeded, deprives Arkwright of the honor of having been the first to use rollers in spinning; but there is no reason to believe that he owed anything to this previous attempt. The first suggestion of the idea, he said, was derived from seeing a red-hot iron bar elongated by being made to pass between rollers. At this time Arkwright was so poor that he needed to be furnished with a suit of clothes before he could appear to vote at an election as a burgess of Preston. Soon after, he removed to Nottingham, to escape the popular rage, which had already driven Hargreaves, the inventor of the *spinning-jenny*, out of Lancashire. Here he fortunately fell in with Jedediah Strutt of Derby, the celebrated improver of the *stocking-frame*, who entered into partnership with him, in conjunction with his partner, Mr. Reed. In 1769 Arkwright set up his first mill, driven by horses, and took out a patent for his invention. In 1771 he set up a larger factory, with water-power, at Cromford, in Derbyshire. Not only was his labor-saving machinery well arranged and ingeniously devised, but he effected such a division of labor and organization of his employés that the greatest efficiency of production was secured. From these mills of Arkwright the modern factory system takes its origin. He was one of the first to introduce the steam-engine into his factories, and the mill at Nottingham was supplied with a Boulton and Watts steam-engine of 1790. The remarkable capabilities of his mind were strikingly evinced in the management of the great business. In 1775 he took out a fresh patent for various additional improvements in machinery. The success attending these undertakings stimulated rivals to invade his patent; and to such an extent did other cotton-spinners use his designs, that he was obliged, in 1781, to prosecute at once nine different manufacturers. The first action, against Colonel Mordaunt, backed by a strong combination of Lancashire manufacturers, was lost, solely on the ground that the description in his specification was not sufficiently clear and distinct. The other actions were abandoned: and, in the following year, Arkwright published a pamphlet containing a statement of his case. In a new trial, in 1785, he obtained a favorable verdict. The whole question, however, was brought finally before the Court of King's Bench, a few months after, when Arkwright's claim to the inventions patented was for the first time called in question. On the doubtful evidence of a person named Highs, or Hayes, combined with that of Arkwright's old assistant, Kay, the jury decided against him, and his patent was annulled. This was but the formal outcome of an opposition which had from the beginning marked out Arkwright as an object of hostility. The manufacturers at first combined to discountenance the use of his yarn. When the yarn was made into calicoes, and Parliament was petitioned to lessen the duty on that cloth, they strenuously opposed the measure, but in vain. Popular animosity was also excited against the man who apparently displaced labor, but in reality increased its sphere; and on one occasion, a large factory belonging to Arkwright was destroyed in the presence of a powerful military and police force, without a word of interference from the magistrates. The energy and good sense of Arkwright triumphed over all opposition, and at the time of his death, in 1792, the value of his property amounted to about $500,000. In 1786 he was appointed high-sheriff of Derbyshire and was also knighted by George III. See Baine's *History of Cotton Manufacture* and Ure's *Cotton Manufacture of Great Britain*.

ARLBERG, ärl′bĕrᴋ. A famous mountain pass between the Rhætian and the Lech Alps, connecting Tyrol with Vorarlberg (Map: Austria, B 3). It lies at an altitude of 5840 feet, along the watershed between the Danube and the Rhine. In 1786 a road was laid across the pass which in those times formed the only means of communication between Vorarlberg and the rest of Austria. The construction of the Arlberg railway from Innsbruck to Bludenz, begun in 1880, necessitated the cutting of a tunnel through the pass. The tunnel is situated between Sanct Anton and Langen and has a total length of nearly 6.5 miles. The highest point of the tunnel is 4260 feet, and the difference between the altitudes of the eastern and western ends is 280 feet. The tunnel was completed in three and one-half years, at a cost of over $7,500,000.

ARLES, *Fr. pron.* ärl; *Eng. pron.* ärlz (anciently, Lat. *Arelate*, or *Arelas*, from Celt. *Arlaeth*, "on the marshy land"). One of the oldest towns in France, in the Department of Bouches-du-Rhône, situated on the left bank of the principal branch of the Rhone, after it has divided into a delta (Map: France, L 8). Arles carries on a considerable trade. It has manufactures of silk, hats, tobacco, brandy, etc., and forms a market for the productions of the surrounding country. It possesses a college, a naval school, a public library, and a superb museum of antiquities in natural history. A canal has been cut which connects Arles with the south coast. Railways also bring it into easy communication with Marseilles, Avignon, Nîmes, Montpellier, etc. Under the Romans, it was the seat of a prefecture; afterwards, for some time, the residence of the Gothic King Euric, and from 879 the metropolis of the kingdom of Arles, or of Cisjurane Burgundy (see Burgundy). This kingdom was united in 933 with that of Transjurane Burgundy, and this larger Arletan realm was ruled by native kings until 1032. On the extinction of this line, the Arletan territories were taken possession of by the German Emperor Conrad II. In the early Christian times, several important councils were convened here (in 314, 353, 452, and 475). At the famous council (synod) of 353, the cause of Arianism gained a temporary triumph. Among the antiquities of Arles are an amphitheatre (Les Arènes) which accommodated between 20,000 and 30,000 spectators; the ruins of a theatre, also of a palace of Constantine the Great; an obelisk of granite dug up from the mud of the Rhône in 1389; a burial-place (the Elysian Fields) used by the Romans; and a Romanesque cathedral dedicated to Saint Trophimus, the western portal of which is a unique example of Gallo-Byzantine art. Population, in 1896, 12,755; in 1901, 15,506.

ARLES, The Kingdom of. See Burgundy.

ARLINCOURT, är′lăɴ′ko͞or′, Charles Victor Prévot, Vicomte d' (1789-1856). A French poet and novelist, born near Versailles. He commended himself to the favor of Napoleon by the publication of the flattering allegory *Une matinée de Charlemagne* (1810), for which he was rewarded with offices at court. Under Louis XVIII. he was appointed *maître-des-requêtes*, but after the Hundred Days was obliged to resign. He wrote several novels, including *Le solitaire* (1821), *Le rénégat* (1822), and *L'étrangère* (1825), of which the first named was extensively read and many times translated. His tragedy *Le siège de Paris*, played at the Théâtre Français, in 1827, was greeted with outbursts of derisive laughter.

AR'LINGTON, A residential town of Middlesex County, Mass., on the Boston and Maine Railroad, six miles northwest of Boston. Market-gardening, ice-cutting, and ice-tool manufacturing are leading industries (Map: Massachusetts, E 3). Arlington has a fine public library, and its water supply is furnished under the metropolitan system. Town meetings are held in March and November and at special times on all matters of appropriations. Settled about 1650, Arlington was separated from Cambridge and incorporated as West Cambridge in 1807, and received its present name in 1867. Population, in 1890, 5629; in 1900, 8603. Consult Cutter, *History of the Town of Arlington* (Boston, 1880).

ARLINGTON. A village in Alexandria County, Va., opposite Washington, D. C. It was formerly the home of Robert E. Lee, but his property was seized by the Government during the Civil War, and is now the site of a national cemetery, in which some of the most prominent officers of the United States army are buried. The cemetery is one of the largest and most beautiful in the United States. There are 18,151 graves, 4608 of which contain unknown dead. The old Lee mansion, with its stately portico, is one of the finest specimens of Colonial architecture. Population (district), in 1890, 2013; in 1900, 3200.

ARLINGTON, HENRY BENNET, Earl of (1618-85). An English politician, member of the famous "Cabal" ministry. He was born at Arlington, and studied at Christ Church, Oxford. At the outbreak of the Civil War he joined the Royalists, but subsequently left England, and in 1654 was appointed secretary to James Stuart. In 1658 he was sent as royal agent to Madrid, and in 1662 was appointed secretary of state, in which post, notwithstanding his ignorance of English law, his knowledge of foreign affairs made him extremely influential.

ARLON, är'lôɴ' (anciently, Lat. *Orolaunum*). The capital of the Belgian Province of Luxemburg, situated sixteen and one-half miles, by rail, northwest of Luxemburg, on an elevated plateau of the Ardennes (Map: Belgium, D 5). It contains a museum with a collection of Roman antiquities found in the neighborhood. The town has frequently suffered the ravages of war, and was occupied by the French from 1684 to 1697. It came into the possession of Belgium in 1831. Population, in 1899, 7997.

ARLT, FERDINAND, Ritter von (1812-87). An Austrian oculist, born near Teplitz. He studied medicine at Prague and was professor of diseases of the eye there from 1849 to 1856, when he was appointed to a similar chair at the University of Vienna. Arlt was the author of a number of works on the eye and its diseases, including *Die Pflege der Augen im gesunden und kranken Zustande* (Prague, 1846, and subsequent editions); *Ueber die Ursachen und die Entstehung der Kurzsichtigkeit* (Vienna, 1876), a number of memoirs in the *Archiv für Ophthalmologie*, of which he was one of the editors, etc. His best-known work is *Die Krankheiten des Auges für praktische Aerzte geschildert* (ed. 1, 3 vols., Prague, 1851-56), which passed through several editions. Consult his autobiography (Wiesbaden, 1887).

ARM (Lat. neut. plur. *arma*, arms, weapons). A weapon of any kind; also used to designate a branch of the military service; as, the cavalry arm, the infantry arm, etc. It has, in addition, a wide application in naval and military terminology to express the end, or branch, of anything, particularly of articles or objects that have two similar ends, as yard arms, axle-tree arms (gun carriage), anchor arms, etc. See ARTILLERY; ORDNANCE; SMALL ARMS; SWORDS, and other weapons.

ARM (Ger., Dan., Swed., and Dutch *arm*, A. S. *earm*, Icel. *armr*, Goth. *arms*, Lat. *armus*, the shoulder, Gk. ἁρμός, *harmos*, shoulder-joint, all from the Indo-European root *ar*, to fit, join). The upper extremity of the human body. It consists of two portions—the arm, strictly so called, and the forearm; the former having one bone, the humerus, which moves freely by a globular head upon the scapula, forming the shoulder-joint; and the latter having two bones, the radius and ulna, which move on the lower end of the humerus, forming the elbow-joint, and below, with the carpus, forming the wrist.

The humerus is attached by a loose capsular ligament to the scapula, allowing great freedom of motion, and were it not for the muscles would be frequently dislocated, but it is supported by muscles on all sides except underneath or opposite the armpit, in which direction the head of the bone is often driven by violence. The roundness of the shoulder is due to the head of the humerus, so that any displacement is accompanied by a flattening, which at once suggests the nature of the accident. On the shoulder there is a large triangular muscle, the deltoid, which lifts the arm from the side. At the back is the triceps, which extends the forearm; in front are two muscles which flex or bend it—the biceps and the brachialis anticus; and on each side below are muscles passing to the forearm and hand; while above the great muscle of the back (latissimus dorsi) and that of the chest (the pectoralis major) are inserted on each side of a groove, wherein lies one of the tendons of the biceps (q.v.). The motions of the ulna are flexion or bending effected by the biceps, and extension or straightening by the brachialis anticus and the triceps, its projections being received in these movements into corresponding depressions on the humerus. The movements of the hand are principally due to the radius, the head of which rolls upon the ulna, thereby turning the palm downward (pronation), or restoring the palm upward (supination), these movements being effected by muscles, two for each movement, which, taking their fixed points from the humerus and ulna, pull the radius round on the latter. The elbow-joint is ginglymoid or hinge-like, and therefore has strong lateral ligaments; but it is often liable to dislocations, which may be accompanied by fracture. The accident being often followed by severe inflammation, the joint is very apt to stiffen (see ANKYLOSIS), thereby seriously impairing the usefulness of the limb; it is, therefore, unadvisable to keep the limb too long in any one position after such an injury. (See JOINTS, DISEASES OF.) The upper extremity is supplied with blood by the brachial artery, the continuation of the axillary trunk. The veins collect into large superficial trunks, which unite at the bend of the elbow, at which situation one may be selected for venesection, and then pass on to the axillary, on the outside by the cephalic vein, on the inner side by the basilic. Deep veins also accompany the arteries and pass upward to join the axillary at its commencement.

The nerves pass down as large cords by the side of the artery, and diverge from it to their ultimate distributions; the musculo-spiral soon passing round at the back to appear on the outside, to become the radial and posterior interosseous nerves; the ulnar running behind the internal condyle, for which it has obtained the term 'funny bone,' from the electric-like thrill which passes along the arm when the nerve is struck or pressed. The median, as its name implies, keeps a middle course with the artery.

In wounds of the forearm, bleeding is sometimes excessive. It may be at once controlled by pressure on the brachial artery, on the inner side of the biceps.

The arm affords excellent illustrations of some of the principles of mechanics. The insertion of the muscles so near, as will be seen, to the fulcra or centres of motion, involves a loss of power in the usual sense of the word; there is, however, a corresponding gain in velocity at the end of the lever, and for most of the purposes to which the hand is put, agility is of far greater moment than mere strength.

ARMADA, är-mā′dȧ *or* är-mä′dȧ (Sp., an armed force), THE. A name especially applied to the powerful Spanish fleet equipped by Philip II. in 1588 for the conquest of England. By permitting the execution of Mary, Queen of Scots, Elizabeth had awakened the indignation of all Catholics; and Scotch, French, and Papal leaders forgot their differences and urged Philip to undertake the invasion of England. Santa Cruz, the ablest seaman in Spain, prepared elaborate plans for the fleet, which was to subdue England. All his specifications (as to vessels, men, and equipment) had to be considerably reduced, but the King raised enormous supplies in utter disregard of the already almost intolerable burdens of the nation. No attempt was made to disguise the purpose of the unusual activities which took place in the Spanish docks between 1586 and 1588. In consequence, the English were on the alert, the crisis was prepared for, so far as the parsimony of Elizabeth would permit; and, in the spring of 1587, Drake raided the Spanish coast and burned all the equipment and supplies of the fleet, causing a delay which gave the English another full year in which to prepare for the attack. Early in 1588 Santa Cruz and his vice-admiral, Paliano, died, and the expedition was intrusted to the Duke of Medina Sidonia, who was wholly unfit for the command. Similar want of judgment was shown in the appointment of the other officers, destined to meet in battle such English seamen as Howard, Drake, Frobisher, and Hawkins. The Spanish counted the victory already won, and named the fleet the "Invincible Armada." The English, on the other hand, were anxious but determined. The Spaniards blundered at the very outset. Alessandro Farnese, Duke of Parma, was in Flanders with a large army intended for the invasion of England, but failed to coöperate with Medina Sidonia. The fleet itself, which consisted of 131 vessels with 8000 sailors and 19,000 soldiers, left Lisbon on May 29, 1588. On account of delays due to storms and mismanagement, it was the 30th of July before the English Channel was reached. The fleet now numbered only about 120 ships, of which 70 could not be used in an engagement. The main English fleet, under the chief command of Lord Howard of Effingham, consisted of about 80 ships, all of them available for action; considerably smaller than the Spanish vessels, but much more easily handled, and with superior fighting equipment. The English commanders took advantage of this fact, and avoided a close contest, such as the Spanish hoped for. Hardly a battle occurred; but for a whole week the light English vessels hung on the rear and flanks of the Armada as it lumbered up the Channel, raking the galleons with rapid shot and escaping almost unharmed from the Spaniards' slow delivery. On August 7 the Armada was driven close to the port of Gravelines, where on the following day Drake made a spirited onslaught upon the Spanish ships. Many of the galleons of the invaders were riddled by the English guns. After a hasty council of war, it was recognized that Parma's army could not be transported to England, and Medina Sidonia turned toward Spain. The English gave chase for a short distance, but soon retired, not being provisioned for a long pursuit. It was necessary for the Armada first to sail around the Orkneys, on account of the direction of the wind. A fearful voyage followed, and only about 50 vessels returned home. Both Philip and Elizabeth seem to have ascribed the failure of the expedition to the storms, which in fact did very largely influence the result; but the English fleet had almost every advantage that counts in a naval engagement, so that the result under any circumstances could hardly have been otherwise. The destruction of the Armada was the collapse of Spain's naval power.

For a detailed account see Froude, *History of England* (London, 1856-70), and *The Spanish Story of the Armada* (London, 1892); Motley, *History of the United Netherlands* (New York, 1861-68); Camden, *History of Queen Elizabeth* (Amsterdam, 1677); Creasy, *Fifteen Decisive Battles* (New York, 1858); Hakluyt, *Principall Navigations* (London, 1589); Corbett, *Drake and the Tudor Navy* (London, 1898); Gardiner, *Historical Biographies:* "Drake" (London, 1894); Green, *History of the English People* (London, 1878-80).

AR′MADALE. A novel by Wilkie Collins, published in 1866, the plot of which hinges on the death-bed confession of Allan Wrentmore, a West Indian, who had assumed the name of Armadale and had murdered a disinherited cousin of that name.

AR′MADIL′LO (Sp. dim. of *armado*, armed, referring to its bony shell). (1) An edentate mammal of the South American family Dasypodidæ, especially characterized by its bony armor. The muzzle is elongated, the mouth provided with feeble teeth destitute of true roots, and set apart from each other, and the tongue is smooth and slender, with a glutinous saliva, adapted to the capture of ants and other insects, after the manner of the ant-eaters, but not long and extensile, like theirs. The limbs are short and strong, as are also the claws, and the animals have a great aptitude for digging and burrowing, by means of which they seek to shelter themselves from enemies—burrowing in sand or soft earth with such rapidity that it is almost impossible to dig them out, and indeed it can only be done by persevering till they are exhausted.

The feature which peculiarly distinguishes the *armadillo*, and in which the animal differs from all the other mammalia, is the bony armor with which the body is covered, and which consists of polygonal plates not articulated, united on the head to form a solid covering, and similarly to form solid bucklers over the shoulders and the haunches; and between these, disposed in transverse bands, which allow of freedom of motion to the body, similar bands in most species protecting also the tail. When alarmed or exposed to danger, armadillos, which have the middle portion of the armor divided into several bands, protect themselves by rolling up into a ball, which exposes only the hard, armored surface. The three-banded armadillo, or apar, of the Argentine pampas (*Tolypeutes tricinctus*) is famous for this and for walking on the tips of its foreclaws.

Armadillos feed not only on insects, but on vegetable and animal food of almost every kind, which by decomposition or otherwise has acquired a sufficient softness. Some of them prefer vegetable food, others delight chiefly in carrion. They are all natives of the warm and temperate parts of South America, in the woods and pampas of which they were formerly found in immense numbers; but all except the omnivorous and adaptable hairy one (*Dasypus villosus*) disappear quickly from the plains wherever a settlement is made. They are timid and inoffensive, although, when they are incautiously assailed, injury may be received from their claws. Their flesh is esteemed a delicacy, particularly that of the species which feeds chiefly on vegetable food. The largest species is fully three feet long, exclusive of the tail; the smallest not above ten inches. The species are numerous, and they are divided among half a dozen or more genera, representing probably three families. The nine-banded armadillo (*Tatusia novemcincta*) occurs as far north as Texas, where it is called "peba," a name properly belonging to some South American species of the genus Dasypus, to which the non-burrowing peludos, common in the pampas, belong. One of the rarest and most interesting of these animals is the little pichiciago (*Chlamydophorus truncatus*), five or six inches long, a native of the Argentine Republic, living underground like the mole, which it much resembles in its habits, and feeding on the same kind of food. Its forefeet are adapted for digging, although in a different manner from those of the mole. The skull is destitute of sutures; there are resemblances to the osteology of birds in the ribs and their union to the sternum; the hinder part of the body is altogether unlike that of any other known animal, in its terminating quite abruptly, as if cut off almost where its thickness is greatest, or as if the back were suddenly bent down at right angles, the tail not springing from where the line of the back appears to terminate, but far below. The whole upper and hinder parts of the body are covered with a coat of mail, made up of a series of square plates; the under parts and legs are covered with long silky hair. See color plate of MAMMALIA; and plate of ANT-EATERS AND ARMADILLOS.

Fossil remains of gigantic extinct armadillos have been found in the Pleistocene strata of South America, forming the genus Glyptodon of Owen.—In *Entomology*, armadillo is a name for wood-lice. See WOOD-LOUSE.

ARMADO, är-mä'dō. A bragging Spanish knight in Shakespeare's *Love's Labour's Lost*, evidently conceived in mockery of the euphuists.

ARMAGEDDON, är'mȧ-gĕd'dŏn (Heb. *Harmagedon*, Mount of Megiddo). The name given to the whole or part of the great plain of Esdraelon (Rev. xvi. 16). See ESDRAELON.

ARMAGH, är-mä' (anciently, Gael. *Ardmacha*, Macha's Height, from *ard*, height, high). A small inland county in Ulster, Ireland (Map: Ireland, E 2); area, 313,035 acres, of which about 27,000 acres are bog and other waste land. The chief crops are oats, wheat, potatoes, turnips, and flax. Large numbers of horses, cattle, sheep, and hogs are raised. The chief towns are Armagh, Lurgan, Portadown, and Newry. Population, in 1841, 233,024; in 1891, 137,877; in 1901, 125,238.

ARMAGH. The capital of the county of Armagh, Ireland, near the Ulster Canal, 34 miles southwest of Belfast (Map: Ireland, E 2). It is situated on rising ground and is built of limestone, quarried in the neighborhood. There are two cathedrals, a Protestant and a Roman Catholic. The former, a cruciform structure dating from the Twelfth Century, built of red sandstone, is supposed to occupy the site of one erected in the Fifth Century by Saint Patrick, the traditional founder of the city. The other is a modern building. Armagh is the seat of the archiepiscopal see of the Primate and Metropolitan of All Ireland, in the Catholic and Anglican churches, and has two archiepiscopal palaces. This city has a college, a large library founded by Primate Robinson, and a famous observatory. Its benevolent institutions include an infirmary, a fever hospital, and a lunatic asylum. Its chief industry is linen-weaving and the manufacture of yarns. Population, in 1891, 7438. Armagh, from the year 495 to the Ninth Century, was the metropolis of Ireland, the native kings living at Emania, two miles to the west of the city. It was then renowned for its school of theology and literature. Between 839 and 1092 the town was sacked five times by the Danes. After the Reformation it suffered severely in the conflicts between the English and Irish. It contained only three slated houses in 1765, but since then, owing to the exertions of Lord Rokeby and his successors to the primacy, it has been largely rebuilt. Consult J. Stuart, *Historical Memoirs of Armagh* (Dublin, 1900).

ARMAGNAC, är'mȧ'nyȧk' (anciently, Lat. *Ager Aremonicus*, Aremonian territory). The name of an old district in Gascony, France, now mainly included within the Department of Gers. Its capitals were Auch and Lectoure. The Counts of Armagnac played an important part in French history from the Tenth Century to the Sixteenth. The most celebrated of the line was Bernard VII. The inhabitants of Armagnac were celebrated as soldiers, and constituted an important element in the French armies during the Hundred Years' War. About the close of this period, their roving bands laid waste large parts of the country, and in order to rid himself of them, Charles VII. sent them to fight the indomitable Swiss, who made short work of large numbers of them. Consult F. Berthault, *L'Armagnac* (Paris, 1899).

ARMAGNAC, Bernard VII., Count d' (? -1418). The leader of the Orleanist party, in the reign of Charles VI. of France, which, from him, took the name *Armagnacs*. The rise of this party was due to the feud between the dukes of Burgundy and Orleans over the possession of the royal power during the incapacity of Charles VI. (q.v.). In the struggle the Duke of Orleans was assassinated and the Burgundians gained the upper hand in the State. Bernard, father-in-law of the Duke of Orleans, assumed the leadership, and in 1413 got possession of Paris. After the battle of Agincourt, in 1415, he became Constable of France. He ruled Paris so oppressively that the populace rose, June 12, 1418, and killed him and all of his party they could find.

ARMAGNAC, Jean V., Count d' (c. 1420-1473). A grandson of Bernard; a notoriously passionate and wicked man. He publicly married his own sister, fraudulently securing a Papal dispensation. Charles VII. took away his possessions, but they were restored by Louis XI. Armagnac later joined the "League for the Public Good," and in consequence was driven into Aragon by the King, and his estates were forfeited. At the intercession of the King's brother, the estates were returned, but Armagnac remained a fugitive and was put to death by the King's soldiers.

AR′MAMENT (Lat. nom. pl. *armamenta*, implements or utensils for any purpose; tackle of a ship). The guns and other weapons of offense supplied to a ship or fortification for use against an enemy. It includes ammunition and gun-mountings, torpedoes, torpedo-tubes, etc. In a broader sense, it is used to designate the whole or a part of the military and naval equipments or forces of a nation.

ARMAND, är′mäɴ′, Charles Teffin, Marquis de la Rouarie (1756-93). A French soldier in the American Revolution. Dismissed from the French service for fighting a duel about an actress, he came to America, and (in May, 1777) entered the Continental Army as a colonel. In October, 1779, he succeeded Pulaski in command of the "Pulaski Legion" (soon renamed "Armand's Partisan Corps"), and in 1783 became a brigadier-general. He returned to France in 1783 and took an active part, on the Royalist side, in the French Revolution. See a *Memoir* by Townshend Ward in Vol. II. *Pennsylvania Magazine of History and Biography* (Philadelphia, 1878).

ARMANDE, är′mäɴd′. One of the elder sisters of Henriette, in Molière's *Les femmes savantes*. Armande, wishing to marry Henriette's lover, tried to marry her off to Trissottin, and would have succeeded but for the interference of her uncle.

ARMANSPERG, är′mäns-pĕrk, Joseph Ludwig, Count von (1787-1853). A German statesman, born in Lower Bavaria. In 1826 he was appointed Bavarian Minister of Foreign Affairs, and soon after exchanged that office for the portfolios of the interior and the finances. He drew upon himself the hatred of the Camarilla by his strenuous opposition to the claims of Rome, as well as by his attempts to identify himself with the Liberal party, and the Roman Catholic clergy brought about his dismissal. He accompanied the young King Otho to Greece in 1833, where for four years he acted as regent or chancellor. Greece derived many benefits from his administration.

ARMATOLES, är′mȧ-tōlz. A body of Greek militia, first formed under the reign of Sultan Selim I. about the beginning of the Sixteenth Century. They were organized to preserve the fertile plains from the ravages of the *klephts*, Christian mountain robbers of Thessaly, Epirus, and Macedonia (from Gk. *κλέπτης*, *kleptēs*, robber), who had never been entirely conquered by the Turks. The Armatoles themselves were originally klephts, but received their more honorable designation when the Porte had transformed them into a sort of military police. The safety of the public roads was intrusted to their care. The whole of northern Greece was divided into fourteen districts, each placed under the supervision of a chief of these militia, who, however, had himself to receive orders from a Turkish pasha or Greek bishop. But although the Armatoles frequently suppressed the brigandage of the klephts, they still regarded them in the light of brothers, inasmuch as they had a common origin and faith; both detested the oppressors of their country, and the sentiment of patriotism overruled every other consideration. This sympathy at last appeared to the Turks so dangerous that they grew alarmed, and desired to substitute for the Armatoles, the Mohammedan Albanians, who were the implacable enemies of the Greeks, which resolution did not a little to hasten the insurrection which the Porte ever dreaded. The moment it broke out, the Armatoles pronounced themselves in favor of the national cause, and in the war of independence that ensued, distinguished themselves by their brilliant exploits. Marco Bozzaris, leader of the Suliotes, was a good type of the Armatole.

AR′MATURE (Lat. *armatura*, armor; Ger. *Anker*). The mass of iron or other magnetizable substance that is placed in contact with the pole or poles of a magnet, or in proximity thereto. In the case of a permanent magnet of the horseshoe pattern, the armature may be of soft iron and act as the *keeper* to help retain and preserve the magnetism by completing the magnetic circuit through the two poles. The armature of an electro-magnet is placed near its poles, and whenever a current of electricity is sent through the coils of the latter, is attracted or repelled. If the armature is a piece of soft iron, attraction always takes place, and on this principle is based the action of the electric bell, the telegraph sounder, and other forms of electrical apparatus. Such an armature, as soon as the flow of the current ceases, returns to its normal position under the action of gravity or of a spring. If the armature is a permanent steel magnet or another electro-magnet, it may move either toward or away from the main electro-magnet, depending on its polarity, and in that case is known as a polarized armature. In dynamo-electric machinery, the term armature is used to designate that portion of the machine in which the differences of electric potential producing the current are generated, and is generally employed to describe the part which is revolved between the poles of the field magnets. The name is used in this connection, since the iron cores on which the coils comprising the armature are wound afford a magnetic connection between the poles of the field magnets, just as is done by the keeper or armature of the horseshoe magnet. See Magnetism; and Dynamo-Electric Machinery.

ARME BLANCHE, ärm′ bläɴsh′. A term of French origin, meaning 'white arm.' It has special application to the dueling foil or rapier (see Fencing), but is often applied to all weapons other than firearms, such as foil, rapier, sword, lance, and dagger.

ARMED NEUTRAL′ITY, The. An association of European powers which, under the leadership of Russia, first gave international validity to the doctrine, proclaimed by Prussia in 1752 and by France in 1778, that "free ships make free goods." Because England insisted on her right to search neutral ships for her enemies' goods in the early years of her war with America, France, and Spain (1775-83), and in consequence crippled the commerce of non-combatant powers, Catharine of Russia, on March 8, 1780, issued her famous proclamation laying down the principles: (1) That neutral ships may freely sail from port to port and along the coasts of belligerents; (2) that a blockade, to be recognized, must be effectual and real; and (3) that, except in the case of contraband, free ships make free goods. These principles were immediately indorsed and adopted by the United States, France, and Spain; and an association, ultimately composed of Russia, Denmark, Sweden, the Netherlands, Prussia, the Empire, Portugal, Turkey, and Naples, was organized for the purpose of enforcing them upon the belligerent powers. The immediate effect was greatly to embarrass England by placing her in diplomatic hostility to the rest of Europe, by increasing the probability of an extended war, and by lessening the advantage which her naval preponderance gave her. The enunciation of the doctrine of "free ships, free goods," at that time marked an epoch in the history of international maritime law.

ARMED SHIP. A ship carrying an armament in contradistinction to one without armament. The term is generally used to designate merchant vessels taken into the service of the government and supplied with a battery; but it was formerly used with reference to private vessels fitted out, by permission of a government, to operate against an enemy's commerce; that is, a privateer. The term has acquired additional importance in recent years, as certain unarmed vessels of the enemy, such as cartels and hospital ships, are exempt from capture; and the tendency of the usages of maritime war, in respect to private unarmed ships, is toward increased exemption from capture.

ARMED SOL′DIER OF DEMOC′RACY, The. Napoleon Bonaparte, so called because he was supposed to give expression to the ideals that succeeded the French Revolution.

ARMENGAUD, är′mäɴ′gō′, Jacques Eugène, called Armengaud the Elder (1810-91). A French inventor and draughtsman. He was born at Ostend and was educated at the Ecole des Arts et Métiers at Châlons. He was professor of mechanical drawing at the Conservatoire des Arts et Métiers at Paris, where in collaboration with his brother, he published a monthly review entitled *Le Génie Industriel*. His works on engineering include: *Traité théorique et pratique des moteurs hydrauliques et à vapeur* (1858); *Nouveau cours raisonné de dessin industriel appliqué à la mécanique et à l'architecture* (1860). He was decorated with the Legion of Honor in 1863, and his work has been recognized by many scientific associations.

ARMENIA (Assyrian *Urartu*, Old Persian *Armaniya*, Persian *Armina*). A high tableland in Western Asia, situated to the southwest of the Caucasus range, stretching southward toward the lowlands of Mesopotamia, and extending from the highlands of Asia Minor on the west to the vicinity of the Caspian Sea. Armenia, in the widest sense of the name, is included between the parallels of 37° 30′ and 41° 45′ north latitude, and the meridians of 37° and 49° east longitude. It embraces the northeast corner of Asiatic Turkey, the southern part of Transcaucasia (Asiatic Russia), and the northwest corner of Persia. The principal portion, having an area in round numbers of about 70,000 square miles, belongs to Turkey (Map: Turkey in Asia, J 2), and is included in the vilayets of Erzerum, Van, Bitlis, Mamuret-ül-Aziz, and Diarbekr. The Russian portion (acquired in part from Persia in 1828, and in part from Turkey in 1878) is included in the governments of Erivan, Yelisavetpol, and Tiflis, and the territory of Kars. Persian Armenia forms part of the Province of Azerbaijan. A great part of the region called Kurdistan is included in Southern Armenia. In antiquity Armenia was divided into Greater and Lesser Armenia, the latter (a small fraction of the whole) being separated from the former by the western headstream of the Euphrates. Between the Armenian table-land and the Caucasus Range is the broad depression of the Kur Valley. The surface is covered with a series of mountain ranges, mostly of volcanic origin, inclosing elevated plateaus, some of which are as much as 6000 or 7000 feet above the sea, and the surface of which consists in great part of pasture land. From these plateaus rise great conical mountain peaks. Mount Ararat, situated where the frontiers of Russia, Turkey, and Persia meet, has an altitude of nearly 17,000 feet. Armenia is watered chiefly by the Euphrates, Kur, and Aras. It contains three extensive salt lakes—Van, in Turkish Armenia (elevation over 5000 feet), Urumiah, in Persian Armenia (elevation over 4000 feet), and Goktcha, in Russian Armenia.

The climate of Armenia is generally healthful, but the temperature is very unsteady. Long and severe winters are followed by very short springs, beginning in April. The summers are hot, and grains and fruit ripen very early. The rainfall is generally scant, and artificial irrigation has been resorted to for centuries past. The flora varies considerably, in accordance with the elevation of the surface. Trees are found at an altitude of nearly 9000 feet, and even higher on the southern slopes. Wheat grows freely as high as 7000 feet above the sea. Southern fruits, such as olives and figs, are cultivated successfully in the warmer regions, while the common fruits are found everywhere. Tobacco, flax, and cotton are also cultivated. The domestic animals of Armenia, and especially horses and sheep, are well known for their good qualities, while the wild animals, such as the bear, wolf, tiger, hyena, leopard, etc., are still found in the woods. The soil of Armenia is generally fertile and well adapted for agricultural purposes.

The turbulent state of the country under the despotic rule of Turkey, however, has always been a serious obstacle to the natural development of the region, and as a result agriculture is very much neglected. Armenia has considerable mineral wealth. The chief minerals are marble, saltpetre, iron, copper, quicksilver, lead, and gold. The population of Turkish Armenia (the chief city of which is Erzerum) is between 2,000,000 and 2,500,000. Of this number, about 650,000 are Armenians, the bulk of the population consisting of Turks and Kurds. The Armenians in Transcaucasia number nearly 1,000,000. The number of Armenians in European Turkey is estimated at about 400,000, and there is a considerable Armenian population in Asiatic Turkey outside of Armenia. Persia is supposed to contain about 100,000 Armenians, and there are about 30,000 in Ciscaucasia. Hungary, Transylvania, and Galicia have about 15,000, and there are several thousand in India and also in Africa. Since the recent massacres by the Turks, considerable numbers have emigrated to the United States.

By language the Armenians, or, as they call themselves, Haik, are entitled to rank as a very old branch of the Aryan stock, in some respects intermediate between the Aryans of Europe and the Aryan peoples of Greater Asia. Physically also they are of a primitive type, short and thickset, dark-skinned, and of exaggerated brachycephalism, in part artificially induced. They are related on the one hand to the 'Alpine' stock in Europe, and on the other to the Galtchas, etc., of Central Asia. Their physical type is probably less pure than is assumed by Ripley (1899), but not so mixed as Deniker (1900) supposes. They inhabited in early prehistoric times a considerable portion of Asia Minor, and have contributed to, or borrowed from, Aryans of other types, Semites, Caucasic peoples, and later intruding Europeans and Turks. Their racial, social, and religious solidarity, and their position in a land that has seen so much of the beginnings of the civilizations of the white race, make them one of the most interesting peoples of Asia. The Armenians are conspicuous by their industry, intelligence, and aptitude for commercial pursuits, and in many cities of the East they are the principal merchants and money-lenders. The bulk of the Armenians belong to the so-called Armenian Church (q.v.).

ARCHÆOLOGY. Cities abounding in superb palaces and temples existed in Armenia from remote antiquity. Armais, grandson of Haig, the conqueror of Nimrod, is said to have built the town of Armavir, long the capital of Armenia, on the banks of the Araxes. When, according to the tradition, Semiramis conquered the country, Semiramocerte, now Van, was built, where important excavations and discoveries have been made in recent years. Christianity, introduced by Saint Gregory, and adopted by his royal convert, Tiridates, c.312, resulted in the demolition of the pagan temples throughout the kingdom and the endowment and building of Christian churches. Among the most interesting examples of Armenian architecture dating from this period are the remains of fortifications, the castle, cathedral, and chapel at Ani, the ruins at Akhlat and at Talin, the troglodyte city of Vardzia, the mediæval castle of Khertvis, the church at Saba, built by Atabeg Sargis (1306-34), and the one at Etchmiadzin, the cathedral of Saint Gregory, the monastery and the churches of Saint Gaine, Saint Ripisme, and of Shoghakath, with its finely sculptured stones.

HISTORY. The Armenians trace their descent from Haig, the grandson of Japhet. His descendant, Aram, is the eponymous hero of the land, which was called Armina by the Persians, and Haik, or Haiastan, by the Armenians themselves. Though possessed of an old civilization, the Armenians first appear in history about the middle of the Sixth Century B.C., when Dikran, or Tigranes, of the Haig dynasty, freed his nation from its subjection to the Assyrians and Medes. Subdued by Alexander the Great, the country was ruled by the representatives of the Seleucid kings until B.C. 190, when the satraps Artaxias and Zariadres revolted against Antiochus the Great and divided the province between them, the former taking the country east of the Euphrates, or Armenia Major; the latter the western portion, or Armenia Minor. Armenia Major was subdued by the Parthians about B.C. 150, and ruled, except for a prief period of Persian domination (A.D. 232-260), till A.D. 428 by the family of the Arsacidæ. The most celebrated prince of the line was Tigranes the Great, who, drawn by his father-in-law, Mithridates, into a quarrel with Rome, was completely overthrown at Tigranocerta (B.C. 69), but was left in power as a client king of the Romans. Armenia thus became a buffer state between the Roman Empire and the Parthians, and was controlled in rapid alternation by the two powers. In A.D. 387 the Byzantines and Persians definitively partitioned the country, the line of the Arsacidæ continuing to rule in Persarmenia forty years longer.

About the year 285 Christianity was introduced into Armenia by Gregory the Illuminator, who succeeded in converting the King, Tiridates III. Zoroastrianism, the old religion of the country, collapsed, the people imitated the example of their monarch, and the earliest national Christian Church in the world arose. The Sassanid rulers of Persia vainly endeavored to extirpate Christianity, and succeeded only in plunging the country into anarchy. The first 250 years of Arab rule (636-885) were marked by bitter conflicts between Mohammedans and Byzantines, but in 885 Ashod I., a descendant of the ancient Jewish family of the Bagratids, or Pagratids, was made king, under the suzerainty of the Caliph, and for more than 100 years the land enjoyed peace. Then ruin came upon it in the shape of Byzantine and Mongol invasions. The Seljuk Turks, and after them Timur, devastated the land, and occupied a portion of it, while the Byzantines seized the rest. Subjugated by the Persians in 1472, part of it was wrested from them by the Ottomans 50 years later, and permanently incorporated into their empire. The northeastern portion of Armenia Major was taken from the Persians by Russia in 1828, who added to her possession in 1878 the Turkish country of Kars and Batum.

Armenia Minor for a long time had a history of its own. It was made a Roman province in A.D. 70; was conquered from the Byzantines by the Arabs about 633, and recovered by the Byzantines 120 years later. In 1080 Rhupen, a descendant of the Bagratids, made himself independent in Armenia Minor; his successors extended their power over Cilicia and Cappadocia, and aided the Crusaders against the Saracens. The house of Rhupen fell in 1393, and the land, after passing through the hands of the Egyptians and the Persians, came into the possession of the Turks in 1541.

Armenia, therefore, at the present is merely an historical conception. The ancient land is divided among the Turks, the Russians, and the Persians, and the Armenian people have been scattered over Asia Minor and a considerable territory in Europe. Aspirations toward national unity have not been wanting among the Armenians, especially those dwelling in Asiatic Turkey. After 1885 a revolutionary movement, inspired by the Russian Nihilist propaganda, attained to formidable dimensions. The Porte intrusted the pacification of the country to the Kurds, who constitute the national police. Sanguinary conflicts, marked by outrageous cruelty on both sides, occurred between the revolutionists and the police in the provinces of Trebizond, Bitlis, and Erzerum, and it was the news of the atrocities committed by Kurds, acting in their official capacity, that stirred Europe and America to horror in the years 1895 and 1896. Signs of anti-Armenian feeling had appeared throughout Asiatic Turkey as early as the spring of 1894. In August of that year a massacre of Armenians was perpetrated at Sassun, and the fever of murder spread all over Asiatic Turkey. All through the spring and summer of 1895 the slaughter of Armenian men, women, and children continued, until the representatives of England, France, and Russia, backed up by their assembled warships, wrested from the Sultan the promise of reparation and reforms. A commission was sent to the scene of conflict to investigate conditions there, and the Armenian Patriarch was summoned to Constantinople to state the demands of the Armenians, which included a share in the making of laws and the administration, and proportional representation in the national police. The Sultan's *irade* went forth, the commission labored, and the massacres continued. During the months of October and November Armenians were butchered at Trebizond, Erzerum, Akhissar, Bitlis, Zeitun, Swas, Kurun, and Marash. At Diarbekr a pitched battle was fought between Turks and Armenians, in which 5000 men perished. In the Provinces of Erzerum and Trebizond entire villages were devastated, famine and plague attacked the survivors of the massacres, and the Turkish Government was forced, only after the greatest reluctance, into permitting the work of relief organized by Clara Barton and the Red Cross Society to be carried on. The outrages subsided in 1896, but in August occurred a fearful carnage of Armenians in the streets of Constantinople, perpetrated by a mob at the instigation of the Government, in retaliation for the attack on the Ottoman Bank made by Armenian patriots, August 26-28. At least 4000 Armenians, and probably twice that number, were beaten to death in the streets and on the roofs by the clubs of hired ruffians. Nor could reparation be demanded of the Turkish Government, inasmuch as the Armenian revolutionists, by their riotous action, had put themselves and their innocent countrymen outside of the law. Since 1896 the sporadic slaughter of Armenians on a minor scale has continued to the present day; but the attention of the powers has been directed elsewhere, and no real guarantees for the safety of the unhappy people have been exacted from the Turkish Government.

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ARME'NIAN ART. This art and that of Georgia are so closely related as to form but a single style, which might be called the art of the Caucasus. Its early antiquities are not very well known: they are related to those of the Sarmathians and Scythians of Turkestan and Siberia, and of the cities of Crimea and the Bosporus. In northern Armenia there are thousands of graves in the form of large mounds, and especially near Kaaban, there are many dolmens. It is from these tombs (e.g., Koban and Kamunta) that the objects have come which show us the condition of the arts here just before and after the Christian era. It was rather late when both Persian and Roman influences penetrated simultaneously. Building had been almost entirely in wood, except in the case of the numerous fortresses. The only ruins yet studied of the Roman period are those at Karni. This region seems to have become an important centre for the propagation of that most interesting form of barbaric art which we associate with Goths, Celts, Scandinavians, Anglo-Saxons, Lombards, and other early Germanic tribes, and of which the treasury of Guerrazar is the most brilliant example. Its main characteristics are: The technique of cloisonné enamel, the setting of colored glass in metal bands soldered to a metal ground, and the use of geometric ornamentation. Beginning in Central Asia, it passed westward, apparently with the emigration of the Goths, by whom it was presumably imparted to the other tribes. Shortly after, when the country had become Christianized, the history of architecture and monumental sculpture in this region began. The churches built between the Seventh and Sixteenth centuries are not large, but have considerable character.

The Caucasus felt the influence of Byzantine art at all times, but added to it, and to its own inherited traits, something from Syria, whose missionaries had converted it and formed its literature. At one time Armenia became, in fact, a province of the Empire politically as well as artistically. Then, during the Middle Ages, the Crusaders gave a Western tinge, and still later came the influence of Russian art. The earliest known church of Armenia, Saint Ripsima's at Vagashabad (618), is thoroughly Byzantine, a Greek cross with its four arms ending in apses and a central dome raised on a drum, circular inside and polygonal outside. As in so many Byzantine churches, the cruciform plan does not appear on the outside, as chapels fill in the spaces between the arms. The church at Usunlar, with its peristyle colonnade, dates from 718-729. Both are still without ornament. It is possible that the church at Dighbur, from its similarities to buildings in Central Syria of the Sixth Century, may be even earlier. Pitzeuda (c. Fifteenth Century), with its high dome and tunnel vaults, is very Byzantine. The culmination of a new style appears in the Cathedral of Ani (1010 A.D.), the most interesting church of Armenia. The exterior, with its central dome raised on a high square drum, its exterior decorated with colonettes, its internal clustered piers and pointed arches, as well as its vaulting system, reminds us in many ways of the European architecture. At the same date a church was built at Mokwi, Byzantine in every particular, and with the greatest similarity to the early Russian Church of Saint Sophia at Novgorod. The contemporary Cathedral of Kiutas in Imerethia is of equal importance, but its plan is basilical instead of a Greek cross. This century was most prolific. In Abkhasia, the church of Mowki, with a charming dome and five naves with slender stone piers and cornices of great delicacy; that of Martvili, in Mingrelia, with exquisite decorative details, are samples of a numerous class of which others are at Manglis, Kaben, Sion, Zarzma, etc. Later, in the Twelfth Century, are others at Bethania, Vardzia, Ghelathi. The purely architectural moldings are very simple; a cornice of a simple cove, sometimes decorated with painted or carved palmettes or foliage; a rude, ball-shaped capital; a torus molding woven into patterns and often carried out so as to join the windows and decorative plaques in one scheme of ornament covering the whole façade. The climax is reached in the Fifteenth Century in the Church of Mtzkhet in Georgia, Armenian in its dome and plan, Byzantine in its proportions, Georgian in its rich interlaced decorative patterns with the addition of Byzantine floral designs. Statuary and figures in relief appear to have been systematically avoided, and when used were crude and provincial. In some churches the king, bishop, or architect is represented holding the model of the building; or Christ is blessing. But the animal and decorative sculpture is much more artistic. The fighting animals are a reminiscence of Persian art; the peacocks, doves, griffins, and dragons, heraldically arrayed or intertwined with vines, are derived from Byzantine models.

The most successful use of decorative sculpture is in the broad bands surrounding the church windows and in the panels let into the walls. These are in very flat and low relief, and are often highly original, differing from Byzantine work and bearing a most remarkable resemblance to the patterns in Celtic-Irish, Anglo-Saxon, and Frankish illuminated manuscripts. This is especially the case in churches of the Eleventh to the Fifteenth centuries. It is interesting that inscriptions were turned to extremely decorative purposes, just as they were in Mohammedan art. The most decorative class of smaller works are the sepulchral slabs usually erected like antique stiles on pedestals in the open air. Their design is graceful in outline and delicate in the detail of their arabesque and lace-work patterns around a central cross or rosette. One cannot help seeing in such as these the originals of the famous Irish, Welsh, and Saxon stone crosses, which are far less exquisite in design and execution. Wood-carving and ivory-carving were practiced, as is shown by some church doors and a multitude of images, book-covers, crosiers, crosses, and other bits of handiwork. But the highest efforts of Georgian and Armenian decoration, with its amalgamation of Sassanian-Persian, of Byzantine and Mohammedan design, are shown in the goldsmith's work, where the metals are combined with enamels and set stones. The treasuries of monasteries and churches in Suanetia, Mingrelia, and other provinces are still extremely rich in such works; especially Etchmiadzin, the national sanctuary of Armenia, Ghelathi, Khopi, Tchukul, etc. None of them are earlier than the Tenth Century. In most cases the ornamentation surrounds some sacred image. The elaborate geometric design, so difficult to follow, and yet so thoroughly scientific, winds over the entire gold surface inclosing the enamels surrounded by pearls, the precious stones framed in gold *cloisons*. The cloisonné enamel employed is another link both with Byzantium and with the primitive jewelry of the Goths and their imitators, the Germanic tribes. It is probable that the process originated in this very region. The local style of figured enamels, of great originality in the Ninth to Twelfth centuries, and independent of Byzantium, is brilliantly shown in those of the Khakul image at Ghelathi and others at Sion, Djumati, Khopi, etc. In jewelry, figured compositions were not avoided, as in large sculpture; especially where the art came strongly under Byzantine influence, and the figures in their crude realism and exaggerated movement again connect with Carlovingian and other branches of the north European art of early mediæval times, rather than with Byzantium. Religieuses, gold images, triptychs, crosses, chalices, book-covers, are among the forms taken by this jewelry. They are found in dozens of church treasuries. Wall-painting was very general during the entire period, and here again considerable independence of Byzantium was shown. The only example of the mosaic work so universal among the Greeks is at Ghelathi, and was a present to King David from Emperor Alexis Comnenus. Caucasian painting was far less stiff and classic than Byzantine. It admitted historic scenes more frequently, and the desire of the artists to glorify events of national interest is shown vividly in frequent portraits of the sovereigns of Georgia and Armenia. Such frescoes are at Sion (Eleventh Century), Nekresi (Eleventh Century), and especially Ghelathi and Bethania. On the other hand, in the numerous illuminated MSS. of the same period (Eleventh to Fifteenth centuries), Byzantine influence predominated. The Georgian are the earliest, and attained perfection in the Eleventh Century. More numerous, but later, are the Armenian. The largest collections of such MSS. are in the Armenian Library in Venice, and in that of the monastery of Etchmiadzin. The Thirteenth Century marks for this, as well as for most other branches of art, the highest point of perfection. In the Seventeenth Century foreign influences—especially Italian and Persian—began to predominate. See ARCHITECTURE; ART, HISTORY OF; BYZANTINE ART.

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ARMENIAN CHURCH. Christianity appears to have been introduced in Armenia as early as the Second Century. It was for the first time firmly established, however, when Bishop Gregory the Illuminator baptized Tiridates, the King (301), and a great party of the people became immediately baptized Christians. (See ARMENIA.) The Bible was translated into the Armenian language in the Fifth Century, by Mesrob and Sahak. After this period great animation prevailed in the Armenian Church. Numbers flocked to the colleges at Athens and Constantinople. In the ecclesiastical controversy concerning the twofold nature of Christ, the Armenian Christians held with the Monophysites (q.v.); refused to acknowledge the authority of the Council of Chalcedon; and constituted themselves a separate Church, which took the title of Gregorian from Gregory himself. For several centuries a spirit of scientific inquiry, especially in theology, manifested itself among them to a far wider extent than in the other Eastern churches. Their greatest divine is Nerses IV., Patriarch of Armenia, and Catholicos, from 1166 to 1173, whose works have been repeatedly published (Latin translation, Venice, 1833, 2 vols.); his *Prayers* in thirty-six languages (1882). The Gregorians have continued to entertain a deeply rooted aversion to the so-called Orthodox Church. The Roman Catholic Popes at various times, especially (1145, 1341, 1440) when the Armenians accepted the help of the West against the Mohammedans, tried to persuade them to recognize the Papal supremacy; but for the most part only the nobles consented to do so, while the mass of the people clung to their peculiar opinons, as we see from the complaint of Pope Benedict XII., who accuses the Armenian Church of 117 errors of doctrine. There is a sect of United or Roman Catholic Armenians in Italy, Galicia, Persia, Russia, and Marseilles, who accept the Papal supremacy. It dates from 1439. Seventeen dioceses are now subject to their patriarch, but he has no authority over Armenians in Russia and Austria. The attempt of Pius IX., in 1867, to Romanize the sect still further, led to a split, and the rebellious fraternized with the Old Catholics in 1872. The congregation of the Mechitarists founded by the Abbot Mechitar in 1701 at Venice, have done much to spread the Roman faith among their people. In theology the orthodox Armenian Church attributes only *one* nature to Christ, and holds that the Spirit proceeds from the Father alone, this doctrine, however, being held by it in common with the Orthodox Greek Church, although contrary to the theology of the Western churches. With respect to the "seven sacraments," it entertains the peculiar notion that at baptism one must be sprinkled three times and as often dipped; that confirmation is to be conjoined with baptism; that the Lord's Supper must be celebrated with wine and leavened bread; that the latter, before being handed round, must be dipped in the former; and that extreme unction is to be administered to ecclesiastics alone, and that immediately after (and not before) their death. It believes in the worship of saints, but not in purgatory. It exceeds the Greek Church in the number of its fasts, but has fewer religious festivals. These, however, are more enthusiastically kept. Divine service is held in Turkey chiefly by night. Mass is celebrated in the old Armenian language; preaching is carried on in the new. The sacerdotal constitution differs little from the Greek. The head of the Armenian Church is called the Catholicos. He resides at Etchmiadzin, in Russian Armenia. Under him are bishops. The Russian Government claims the right of appointing him. But of more consequence are the patriarchs of Jerusalem and Constantinople, who are nominally under the Catholicos. The monks of this Church follow the rule of Saint Basil. The wartabieds (vartabeds) form a peculiar class of ecclesiastics; they live like monks, but are devoted exclusively to learning and preaching. Secular priests must marry once, but none is at liberty to take a second wife. Since 1830 very successful Protestant missions have been carried on among the Armenians.

Consult Malan, *Divine Liturgy of the Armenian Church* (London, 1870).

ARMENIAN LAN'GUAGE AND LIT'ERATURE. The Armenian language forms one of the eight main divisions of the Indo-Germanic group. Owing to the presence of many loan-words from the Iranian languages, Armenian was for a long time supposed to be an Iranian dialect, and this theory was defended especially by Paul de Lagarde and Friedrich Müller. A more scientific investigation of the language, however, has overthrown this view, and the independence of the Armenian has been conclusively shown. For this great contribution to philology we are indebted most of all to Heinrich Hübschmann. Valuable studies on the Armenian language and literature have also been made by Meillet, Bartholomæ, Bugge, and others. The Armenian language is divided into two parts: The Old, or Classical (*grabar*) Armenian and the Modern Armenian. The Classical Armenian language shows no dialectic variations, but the modern Armenian has many dialects, whose study is most important for a correct scientific philological knowledge of this Indo-Germanic tongue. The Classical Armenian is a fully inflected language, possessing seven declensions with six cases (nom., gen., dat., acc., abl., and instr.) and two supplementary cases (narrative and circumlocutory). There is also, as in all Indo-Germanic languages, a special mode of declension for the pronouns. There is no gender in Armenian, and but two numbers, singular and plural. Comparison of adjectives, which are often uninflected, is chiefly by auxiliary adverbs or by repetition of the adjectives to be compared. There are four conjugations, of which the fourth is generally passive in force, with present, imperfect, first and second aorist, and first and second future, present and future participle, and infinitive tenses. As in Greek, but one of the futures and aorists is commonly found in the same verb. The moods are the indicative, subjunctive, imperative (or more properly, prohibitive). The Modern Armenian differs from the *grabar* chiefly in the decay of its inflectional system, in the influx of loan-words from the Turkish, and in the interchange of pronounciation of the old *tenues* and *mediæ* with the new (Classical Armenian *b*, *g*, *d*, *k*, *p*, etc., pronounced *p*, *k*, *t*, *g*, *b*, etc., in Modern Armenian). The Armenian is fond of harsh combinations of consonants and it is particularly rich in affricative sounds. The accent is usually on the last syllable. The Armenian alphabet consists of thirty-six letters, to which two others, ō and *f*, were added in the Twelfth Century. This alphabet was introduced by Mesrob, a bishop of the Armenian Church, early in the Fifth Century, and was probably based upon the Greek letters, with additions from other sources to provide characters for sounds not represented in the Greek alphabet. In addition to the sounds familiar to our ears, Armenian possesses characters for the indefinite *e* in *the man*, for *zh* (French *j*), *h* (as in German, Greek χ), *sh*, *ts*, *ds*, *tch*, *dsh*, *thsh*, *tsh*, rolled *r*, for the aspirates *th*, *ph*, *kh*, and for a deep glottal catch corresponding somewhat in pronunciation to the Arabic *ghain*.

Armenian literature, properly speaking, begins only with the Fifth Century, when Mesrob devised the alphabet, and the entire Bible was rendered into Armenian by 410. Before the time of Mesrob there had been no Armenian literature (although a few Armenian songs are preserved by Moses of Chorene) despite the claims made for Agathangelos (ed. Venice, 1862, Tiflis, 1883) and Faustus of Byzantium (ed. Venice, 1889), who probably wrote in Greek, and was translated into Armenian later. Armenian literature is especially strong in history and in theology; but in poetry and belles-lettres it is very weak, and the drama does not exist. The principal Armenian writers (exclusive of translators) are as follows: Fifth Century, Eznik of Golp, *Refutation of Heresies*, especially valuable for its account of the Zoroastrian and Manichæan religions (ed. Venice, 1850); Moses of Chorene, *History of Armenia*, a most important source of material (ed. Amsterdam 1695, London 1736, Venice 1752, 1827, 1865, 1881, translated by Le Vaillant de Florival, Venice, 1841, and by Lauer, Regensburg, 1869), and a geography (ed. and tr. Venice, 1881); *David the Philosopher* (ed. Venice, 1823); Elisæus, *History of Vardan and of the Battles of the Armenians* (ed. Constantinople, 1764, 1823, Venice, 1828, 1852, 1859, 1893, tr. Neumann, London, 1830); Eighth Century, John of Ozim, a theological writer (ed. Venice, 1834); Ninth Century, Thomas of Ardsruni, an important historian; Tenth Century, Gregor Narek, religious writer (ed. Venice, 1827-40); Eleventh Century, Gregor Magistros, theologian, grammarian, and poet; Twelfth Century, Nerses Klayensis, poet, theologian, historian (ed. of his poetry, Venice, 1830), and his nephew, Nerses of Lampron, theologian, poet, and translator; Mechitar Gosh, fable-writer (ed. Venice, 1854) and lawyer (ed. Etchmiadzin, 1880); Thirteenth Century, Vardan, who composed an important history of Armenia (ed. Venice, 1862), a book of beast-fables (ed. in selection, Paris, 1825), and theological works; Vahram of Edessa, historian (ed. Madras, 1810); Johannes Erzingensis, historian, grammarian, theologian, and astronomer; Fourteenth Century, Gregor Dathериensis, theologian. The last great author who wrote in Classical Armenian was Tschamtschean (died 1823), whose most important work was a history of Armenia from the earliest times to 1784 (ed. Venice, 1784-86). The golden ages of Armenian literature are the Fifth Century and the Twelfth Century, and the Fourteenth Century marks the beginning of a steady decline. The first book printed in Armenian was the Psalms (Venice, 1565), and during the Seventeenth and Eighteenth centuries printing-houses were established in many cities in Europe, as well as in Asia—at Julfa, Smyrna, and Madras. A special impetus toward the preservation of Armenian literature was given by the establishment of a college and convent by Mechitar on the island of San Lazaro near Venice, in 1717.

Bibliography. Petermann, *Grammatica Linguæ Armeniacæ* (Berlin, 1837); *Brevis Linguæ Armeniacæ* (Leipzig, 1872); Laurer et Carrière, *Grammaire arménienne* (Paris, 1833); Hübschmann, *Armenische Studien* (Leipzig, 1883); *Armenische Grammatik I.* (all out, Leipzig, 1897); Msériantz, *Studies on Armenian Dialectology* (*Styudi po Armyanskoi Dialecktologie*), I. (Moscow, 1897); Bedrossian, *New Armenian-English Dictionary* (Venice, 1875-79); Neumann, *Geschichte der armenischen Litteratur* (Leipzig, 1836); Nève, *L'Arménie chrétienne et sa littérature* (Louvain, 1886).

ARMENIAN VER'SION. See Bible.

ARMENTIERES, är'mäɴ'tyâr'. A town of the department of Nord, France, on the Lys, 8 miles from Lille. It posseses a college, hospital, and insane asylum. The town is well built, and is active and prosperous, having manufactories of cotton, linen, and hemp, and a considerable trade in grain. Pop., 1901, 29,401.

ARME'RIA. See Thrift.

ARM'FELT, Charles Gustavus (1666-1736). A Swedish general, born in Ingermanland. After serving with distinction in the French armies he returned, in 1700, to his native country, and as commander of the Swedish troops in Finland fought valiantly against the Russians, whose superior strength, however, forced Armfelt to abandon the province in 1714. In 1718 he led a Swedish expedition into Norway, met with ill success, and on the retreat lost almost his entire army through starvation and disease. Subsequently he received his old post of Governor of Finland.

ARMFELT, Gustav Mauritz (1757-1814). A Swedish courtier whose public life was characterized by striking vicissitudes of fortune. He was born in the Government of Åbo. His loyalty to Gustavus III. gained him the favor and friendship of that monarch. Armfelt distinguished himself in the war between Sweden and Russia, and as military representative of Gustavus, had the honor of concluding a peace at Wärelä in August, 1790. By the will of Gustavus, who was assassinated in 1792, Armfelt was made Governor of Stockholm and a member of the council assigned to the regent, Charles, Duke of Sudermania. The Duke, however, could not brook the idea of a check being placed upon his liberty of action, and found means to destroy the will, the conditions of which he never intended to observe. Armfelt soon became conscious that his influence was rapidly disappearing. He was rarely permitted to see the young King; and at last, after a secret interview with the Crown Prince Gustavus, departed as ambassador to Naples in July, 1792. While in Italy he entered into correspondence with certain parties in Sweden for the purpose of overthrowing the regency, and inducing the States to proclaim Gustavus IV. of age. The correspondence was discovered. Armfelt fled to Poland and afterwards to Russia. He was condemned during his absence for high treason, and stripped of his goods and titles, while many of his friends were visited with torture and exile. In 1799 Gustavus IV. received the crown at the age of eighteen and Armfelt was restored to all his honors. In 1805 he was appointed Governor-General of Finland, in 1806 he commanded the Swedes in Pomerania, and in 1808 he commanded the Swedish army raised for the invasion of Norway; but his plans were so completely frustrated that he was compelled to witness the invasion of Sweden by the successful Norwegians, and was in consequence recalled and dismissed by the King. In the following year a revolution took place, Gustavus was deposed, the Duke of Sudermania elected in his place and Armfelt was appointed president of the Military Council. But shortly after he resigned and retired to Russia, where he lived during the remainder of his life in high honor. The title of count was conferred on him; he was made chancellor of the University of Åbo, president of the Board of Finnish Affairs, and member of the Russian Senate. He died at Tsarskoye-Selo. Consult Tegnér, *Gustav Mauritz Armfelt* (Stockholm, 1887).

ARM'GART. A dramatic poem by George Eliot, published in *Macmillan's Magazine* in July, 1871, and containing a female character of singular strength and fortitude, of the same name. Armgart refuses a splendid offer of marriage in order to pursue her ideal life as a great singer. Her voice fails, and she retires, broken-hearted, to teach music in a small village.

ARMIDA, är-mē'dȧ. A beautiful sorceress in Tasso's *Jerusalem Delivered.* She was employed by Satan to seduce Rinaldo and other Crusaders upon their arrival before the Holy City. Lured away by Armida to her pleasure-palace, Rinaldo for a time forgets his vows, but is released from the spell by a powerful talisman. He returns to the war, but is followed by the sorceress, who at last rushes into battle against him. She is defeated by Rinaldo, who then declares his love for her, converts her to Christianity, and vows to be her faithful knight. The story of Armida has been made the subject of operas by Lully (1686), Gluck (1777), Cherubini (1784), Zingarelli (1786), and Rossini (1817).

AR'MIES (Fr. *armée,* through Med. Lat. *armata,* an armed force, seen in Sp. *Armada,* properly fem. of Latin p. p. *armatus,* from *armare,* to arm). Armed forces, organized under a regular system, for purposes of defense. The term 'army' may describe the military strength of the nation of which the force is a part, or by which it is employed; but it may also be used to describe an army which is only a part of the military forces of the country to which it belongs; as, for instance, the United States Army in Cuba or the Philippine Islands. The fundamental principle of combat is the same, whether between two individuals or two nations, and out of that principle has developed the art and science of war. From the earliest times when men first joined with one another for warlike purposes, there have been changes and developments in methods of association, discoveries in the realm of strategy and the application of tactics, as well as a constantly increasing number of inventions of weapons, mechanical devices, and other engines of destruction. In a primitive state of society the army as such does not exist, and the fighting force is co-equal with the group, the tribe or the nation. Military service is not only a duty but a privilege, and the right of carrying arms is one of the great distinctions between the freeman and the slave. Citizenship and warriorship as a rule go together; and among the early Germans the attainment of a youth's majority and his admission to a share of political rights was marked by an elaborate ceremony of assumption of arms, which with time passed into the chivalric ritual of admission to knighthood. The closest identification of army and nation is perhaps to be found among nomad tribes, where from time to time the shifting of the entire population is necessitated by failing of pasture. Such a migration, peaceful when unresisted, assumes the character of a hostile invasion when the desired territory is in the possession of a tribe strong enough to attempt resistance. Thus, too, in the great migrations preceding and succeeding the fall of the West Roman Empire, the Germanic warriors, marching from their old homes in the north to the conquest of a new home within the Empire, and accompanied by their wives, their children and their household goods, offered a complete example of army and nation as one. With the establishment of permanent states the differentiation between citizen and warrior begins, and this development is greatly hastened by the growth of industry; for if the farmer finds it a hardship to be summoned from the plow to the field of battle, the burden falls still heavier on the industrial laborer, with whom the conditions of production are such as to require constant application. The process thus begun continues until in countries like Great Britain or the United States, where military service is on a contractual basis, the total separation of warrior and citizen is attained. These considerations must be borne in mind in discussing the history of the evolution of the army. Beginning with the earliest organized armies of which there is record, below will be found an historical outline of this development.

ANCIENT ARMIES.

Egyptian. Under the Old and Middle empires (down to about 1900 B.C.), the wars of Egypt were comparatively unimportant. During this period a sort of feudal system prevailed, and the main strength of the army was furnished by the militia of the nomes, commanded by the monarchs or their deputies, together with the contingents of the great temple estates and of the royal domains. In addition, a certain number of mercenary troops were drawn from the tribes of northern Nubia. Under the twelfth dynasty, and perhaps earlier, there was also a permanent corps, the "Retainers of the King," which seems to have filled the place of a standing army. No cavalry or chariot force existed, as the horse does not appear to have been introduced into Egypt until about B.C. 1600.

The Hyksos wars, which swept away the old feudal system, aroused the military spirit of Egypt, and under the New Empire (from about 1580 B.C.) a standing army was a necessity. It was composed chiefly of barbarian mercenaries, the native troops playing a rather unimportant part. Under the Saïtic dynasty (B.C. 645-525), Greek mercenaries were largely employed. The bulk of the army under the New Empire was formed by the infantry, armed with spear and heavy shield, or with light buckler and bow. The chariot force constituted the flower of the army. Each chariot contained two soldiers, of whom one fought with his bow and other weapons, while his comrade drove the horses. Great attention was paid to organization and discipline. The troops were divided into regiments and companies, and, in time of war at least, the regiments were formed into brigades or divisions. A special force, called the Mazay, was organized as a gendarmerie, or armed constabulary, but was sometimes employed in war. See Erman, *Life in Ancient Egypt* (London and New York, 1894), chapter xx.

Indian. Quite extensive descriptions of armies, battle arrays, and of warfare among the ancient Hindus are preserved in the *Mahābhārata* (q.v.) or *Iliad* of India, and in the seventh book of the great legal code of Manu (q.v.). The information which these sources furnish with reference to the constitution of the military force of early India serves to supplement such allusions to armed equipments and fighting as may be gathered from the earlier times represented by the Veda (q.v.). Among the organizations of an army early recognized in India was a distribution of the forces into nine subdivisions, on the ascending scale, ranging from a squad (Sanskrit *patti*), composed of 1 chariot, 1 elephant, 5 foot-soldiers, and 3 horsemen, up to an army corps (Skt. *akšāuhiṇī*), comprising 21,870 chariots, 21,870 elephants, 109,350 foot-soldiers, and 65,610 cavalry. The code of Manu likewise provides for various arrangements for drawing up of the forces in manœuvring, fighting, and encamping. These are interesting for students of military tactics to look up. On the march and in action the King was naturally stationed in the centre for safety; the commander was in the vanguard, unless, through the exigency of the situation, his presence was demanded elsewhere. Details may also be gathered from the sources mentioned with reference to the armor and accoutrement of the soldiers and all matters appertaining to military forces and warfare. The best work on the subject is Hopkins, *Ruling Caste in Ancient India*, published in the *Journal of the American Oriental Society*, Vol. XIII. (New Haven, 1889).

Persia. The organization of the Persian army in ancient days appears to have corresponded largely with the divisions introduced into the forces of Media at an earlier date by King Cyaxares (q.v.), as mentioned by Herodotus (c.103). This general distribution into infantry, composed of spearmen, bowmen, and others, and into cavalry, supplemented by warriors mounted on chariots, prevailed throughout the history of the Persian Empire. The cavalry was the flower of the army, as Persia was ever famous for her horses and her excellence in horsemanship. These mounted forces occupied the wings of the main body. This latter mass was composed of the people, and was often little better than an armed mob. The scythe-bearing chariots were drawn up as a division in front of the army, and they seem to have inspired terror into the foe, but were often less effective than the other forces. The use of elephants is found as early as in the campaigns to oppose the invading Alexander. From Herodotus (vii. 61, 84) and other sources we learn that the characteristic equipments of the Persian soldiers were a short straight sword, a long spear, a bow, quiver, battle-axe, mace, or club, and a sling, according to the special district or province from which the levies came. A large wicker shield and a close-fitting leather tunic and trousers, a coat of mail, or a quilted corselet, completed the outfit. The horses as well as the riders were protected by mailed trappings—at least if we can judge from the caparison of the war-horses on the sculptures in Sassanian times. A division of the army on the decimal scale of tens, hundreds, thousands, and tens of thousands may be gathered from Herodotus (xii. 81), and seems to be as old as the Avesta (q.v.). The Persian hosts have ever been proverbial for numbers, and even allowing for exaggeration, the figures must have been enormous. The army which Xerxes led against Greece has been estimated at hardly less than 2,000,000, and Darius is reputed to have opposed the world-conquering Alexander with a force of between 750,000 and 1,000,000 men. The development and history of the Persian army during the Parthian and Sassanian periods, down to the overthrow of the Persian dominion by the Arab conquest and its subsequent results, may be obtained from a study of those times. On Persian armies and armor consult Jackson, *Classical Studies in Honour of*

Henry Drisler (New York, 1894); *Zoroaster the Prophet*, chapter vii. (New York, 1899); Spiegel, *Eränische Altertumskunde*, Vol. III., 638 ff. (Leipzig, 1878); Kelsey, *Xenophon's Anabasis, Introduction* (Boston, 1895); G. Rawlinson, *Story of Parthia*, p. 397 ff. (New York, 1893).

GREECE. In the Homeric poems the mass of the infantry is of little account—at least to the poet. The fighting is chiefly carried on by the individual heroes, armed with lance and sword, and defended by helmet and shield and sometimes corselet. These heroes go to and from the battlefield in chariots, but in general fight on foot. When the historic period opens, we find that the war chariots have disappeared, and even cavalry, though the arm of the nobles, is not of decisive value. The army is composed of the hoplites, or heavy infantry, armed with helmet, breastplate, greaves, and shield, and carrying a short sword and long spear. These men fought in close formation, usually eight deep, supported at times by cavalry on the wings, and with light troops, armed with javelins, bows, or slings, to skirmish in front and cover the rear. *Lacedæmonian.*—Through the early days of Greek history the Spartan hoplites were regarded as model troops. Their success seems to have been due in part to their rigorous gymnastic training; but still more to a severity of drill such as the other Grecian states seldom required. From the age of twenty to sixty every Spartan could be called upon to serve, though the older men were not called out except in emergencies. This discipline enabled them to change front in the presence of the enemy, and held them steady in defeat or victory. *Athenian.*—The Athenian army was a militia. Every man was supposed to receive training and to serve when called upon—the richer as hoplites, the poorer as light-armed troops, while the cavalry was made up from young men of the wealthy families. As the Athenians never spent so much time in drill as the Spartans, they do not seem to have reached their combination of firmness and mobility, though Athenian bravery and skill were shown in many hard battles.

The general formation of the Greek armies remained but little changed for over a century. Marathon, Platæa, and Mycale were fought by the phalanx of hoplites against light-armed Orientals, and the same tactics and the same results are seen in B.C. 401, at the battle of Cunaxa, when the 10,000 Greeks overthrew the Persians opposed to them. *Thebans.*—These had long enjoyed high repute as hoplites; but their contribution to the Greek art of war was rather in the development of a formation in deep column (fifty deep at Leuctra, B.C. 371). This heavy mass was hurled against one wing of the enemy, while the rest of the line, in ordinary formation, was held back to prevent any flank movement upon the attacking column. This innovation contributed largely to the success of Epaminondas and the establishment of Theban supremacy in Greece. *Macedonian.*—Upon these tactics of the Thebans, Philip of Macedon and Alexander the Great developed their armies. The central principle was personal duty to the King on the part of noble and peasant. "Companions" and "Foot-Companions" were the names of the heavy cavalry and infantry. The former wore metal cuirasses and carried lances; the latter had a small shield and a pike about eighteen feet in length for the rear ranks. They were drawn up in very close order. In general, Alexander seems to have preferred the old depth of eight men; but under his successors the phalanx was deepened to sixteen men, and became an unwieldy mass, formidable on level ground, but easily broken if a rough surface opened up the close ranks. This was shown again and again in the battles between the Romans and Greeks. An important change in the art of war was the introduction by Philip and Alexander of a charge by heavy cavalry as the decisive feature of the attack, instead of the column of infantry used by Epaminondas. The Macedonians also developed the use of military engines hurling huge stones and arrows, both for siege purposes and also to some extent like modern artillery in actual battle.

ROME. While to the Greek belongs the credit of developing warfare into a science, it was left to the Roman legionary, with his perfect discipline and still more perfect organization, to make it effective. The leading characteristic of the Roman soldier was discipline rather than individual prowess. Great national characters like Camillus, Cincinnatus, Papirius Cursor, and Fabius Maximus were not so much heroes or strategists as commanders and disciplinarians. The fact that the Roman soldier was never the military equal of the Greek hoplite at his best, and that he had no great advantage, man to man, in a pitched battle even with savages, was demonstrated over and over again during his career of world conquest.

In the earliest period of Roman military history, all able-bodied citizens, under the King as commander-in-chief, were compelled to serve in the army in time of war. It was under Servius Tullius, however (according to Roman legends, the sixth King of Rome, B.C. 578-534), that the first real organization took place. On the basis of a property qualification, citizens were divided into classes or grades (*centuriæ*); and each class subdivided into *seniores*, or elderly men, assigned only to light garrison duty, and *juniores*, or effective warriors; with the addition of two *centuriæ* of *fabri* (pioneers), two of *cornicines* (military musicians), and one of *proletarii*. The armies were made up by tribal levies, made in a general public assembly, usually on the Campus Martius, and each tribe was called upon to furnish an equal number of men. Out of a total of 25,000 men, there would be 8000 *seniores* and 17,000 *juniores*. The soldiers thus chosen were formed into four legions and a cavalry corps of about 1800 horsemen. The legion (q.v.) on service consisted normally of about 3000 men, not including the *velites*, or lightly armed skirmishers, and a squadron of cavalry. In regular formation the *hastati* (heavily armed infantry), about 1200 strong, and arranged in 10 files, constituted the advance guard; following, was a similar body of *principes*, and a reserve or rear-guard of *triarii*, usually arranged in 5 files.

The equipment of all three divisions was practically identical, and consisted of a short cutting and thrusting sword worn on the right thigh; two javelins, one light and one heavy; metal breastplate, large shield, and brazen helmet and greaves. The Roman attack differed from that of the Greek phalanx, in that, instead of fighting shoulder to shoulder and closing in together as gaps were made, they adopted a loose formation, which permitted the soldiers in the rear to fill up gaps caused by casualties, and thus maintained their front intact. In combat the *triarii* used the *pilum*, a short, heavy spear which they threw into the ranks of the enemy before engaging them with the sword. The three divisions of the legion (*hastati*, *principes*, and *triarii*) were each arranged in ten companies (*manipuli*), to each of which was assigned a detachment of *velites*. The *manipulus* was under the command of a centurion (*centurio*), whose lieutenant was a junior centurion. In the event of the disablement or absence of the officer commanding the legion, command would devolve on the senior centurion of the first company of the reserve (*triarii*). Normally, the chief command was taken two months at a time by each of the six military tribunes (*tribuni militum*). With the first civil war, however, arose the necessity of a single permanent chief, which arrangement was eventually adopted; a single officer (*legatus*) commanding each legion, assisted by a staff composed of the former military tribunes. The year B.C. 276 witnessed the advent of the professional or paid soldier. The long and heavy wars with Pyrrhus and Carthage led to the formation of a regular army; so that dating from the time of Marius (or from the beginning of the First Century B.C.) the enlisted man served for a period of twenty years. The legion, as now arranged, was composed of 6000 men, divided into 10 cohorts of 600 men each, all armed with the *pilum*. The *velites* were replaced by foreign mercenaries, of whom the most famous were *sagittarii* (bowmen) from Crete; *iaculatores* (javelin men) from Mauretania; and *funditores* (slingers) from the Baleares. With the exception of a few Roman *equites*, who held the more important positions, the cavalry also was entirely foreign. Organized into cohorts were auxiliary troops of infantry and cavalry. The next reorganization took place toward the close of the First Century B.C. under Augustus, who, besides confirming the period of service as twenty years, also introduced the pensioning of veterans. Twenty-five legions were now established and distributed in different parts of the Empire. Subsequently great changes took place in the army. The typical Roman soldier was no longer the invincible legionary, who, covered by his shield, had fought his way through the most stubborn pikemen, beaten back great hordes of Eastern horsemen, and resisted the wild rushes of impetuous Celts and Germans.

At the beginning of the Third Century A.D. the work of Augustus and others was beginning to fall to pieces; in the Fourth, it was scarcely anywhere in evidence, and by the end of the Fifth it had become a thing of the past. The exigencies of border warfare, with the extended system of permanent camps connected by patrols, had developed cavalry and light infantry at the expense of the older legion. In the Third Century A.D. the elaborate system of frontier defense and interior garrisons broke down, and the Empire was subjected to both civil war and foreign invasion. While the legions were engaged in civil strife, the opportunity of the enemy arrived. The frontiers were simultaneously attacked, and the Empire reeled under the shock. The Persians were rising to power in the East (A.D. 226); the German tribes were confederating and becoming correspondingly formidable; and the Franks, Alemanni, and Goths appeared along the Rhine and the Danube. Diocletian, however, with the reconquest of Britain in A.D. 297, restored the Empire to a semblance of its former power and unity. With the aid of wholesale taxation he replenished the exchequer, and regarrisoned the military frontier. The changes and additions brought about by Diocletian are remarkable for the value he placed on the troops of mixed nationality and for the growing neglect of the ancient Roman legion. He also enlisted many new bodies of horsemen: *cunei*, *alæ*, *vexillationes*, etc., being raised alike for the limitary, the comitatensian, and the Palatine armies, among whom Germans, Moors, and Persians were more numerous than the born subjects of the Empire. Under Constantine, the old legionary cavalry disappeared altogether, and cavalry and infantry became separate commands; yet under him and his successors, though cavalry grew considerably in relative importance, the infantry still remained the more important arm. The decadence in physique and *morale* of the Roman army at this time was largely due to the fact that the corps were less homogeneous, and the substitutes and recruits bought by the land-holding classes were often of bad material. The increasing boldness of their foes and the constant civil and internal dissensions had a baleful effect on the old-time *esprit-de-corps* of the rank and file, and, together with the growing luxury and increasingly enervating vice of the times, soon brought about the disintegration and decay of the magnificent Empire. It is interesting to note that in many instances modern conditions have compelled the adoption of units of military command and forms of military procedure strikingly similar to those of the Romans; while the legionaries' sword, after passing through the radical forms and changes of the Middle Ages, has again appeared in the shape of the modern infantry sword-bayonet, which in shape and size closely resembles the Roman sword.

MODERN ARMIES.

The evolution of the modern army has been along the lines of national and mechanical development: national needs and aspirations dictating its origin, organization, and strength, and the progress of mechanical invention its tactics and equipment. Mediæval armies, whose organization and characteristics will be found discussed under FEUDALISM, were made up chiefly of the retainers, dependents, and followers of the nobility; and were usually employed in the petty struggles of their leaders, or in assisting the King to make war on a larger scale. The success of the King invariably meant gifts of land to the victorious nobles fighting under his banner: who, in turn, rewarded their knights and squires by smaller gifts of land, or land privileges, thus building up the feudal system. The holding of lands implied service due to the giver, and as a consequence many of the nobility vied with their king in power and prestige. The Crusades did much to develop the idea of coöperation; but at the best the different armies participating were practically independent of each other. It was an age when science was unknown, and the want of intellectual occupation made war the favorite occupation of the higher classes. Individual prowess and bravery were the standards by which battles were fought and won, the fate of a battle frequently depending on a personal combat between two knights. Under such circumstances, the science of war could never attain a high degree of efficiency; nor could any general organization be effected.

It was not until the reign of Charles VII. of France that any regular attempt at organizing a standing army was made, although the Turkish janizaries (q.v.) had been in existence for almost a century before. The Swiss mercenaries, bodies of professional soldiery, were in great demand during the Middle Ages, their military qualities often successfully deciding the issue of a battle. The employment of mercenaries consequently soon became general; so much so, that voluntary patriotic service ceased altogether. Widespread dissatisfaction, however, soon developed, owing to the heavy expense involved, and the danger of intrusting the safety of the State to hired foreigners, who, recruited from the very dregs of society, had to be kept under the strictest discipline and surveillance. It followed as a natural result that organization and the consequent sinking of the individual in the mass eradicated the older forms of knighthood, with their attendant feats of arms and examples of personal skill and daring.

In the reaction from the burden and expense of mercenary armies the present European Continental military system had its inception. The use of firearms by this time had become more general; the proportion of musketeers in the various armies between the beginning of the Sixteenth and the end of the Eighteenth centuries had considerably increased, and the pike was superseded by the bayonet. Changes of weapons naturally influenced and brought about a change in tactics. In the Thirty Years' War (1618-1648), Gustavus Adolphus and Wallenstein employed directly opposite infantry formations. (See INFANTRY.) The former arranged his men six ranks in depth, and gained corresponding length of line. Wallenstein, on the other hand, used a narrower front by placing his men in from twenty to thirty ranks. The gradual thinning down to the famous "thin red line" made historic by the English, who have always used the line in preference to the mass of columns of their opponents, and from that to the widely extended front rendered necessary by modern rapid and long-range firearms, is a matter of comparatively recent military history. In the reign of Louis XIV. of France (1643-1715) the grouping of brigades and divisions was first introduced, and in the next century Frederick the Great of Prussia (1740-1786) reduced his infantry formation to three ranks, and introduced a most rigid and exact system of drill and discipline. He was also the originator of horse artillery (1759). (See ARTILLERY.) The contest waged by France against Europe from 1792 to 1797, together with her terrible internal warfare, had largely exhausted the tremendous levies which had hitherto supplied her armies, and in 1798 a law was passed establishing compulsory military service. (See CONSCRIPTION.) This compelled all Continental Europe to follow Napoleon's example, so that to-day voluntary enlistment in Europe survives in England alone.

A summary of the strength, composition, and general characteristics of the armies of the world at the beginning of the Twentieth Century, so far as can be ascertained, is given below:

ABYSSINIA. The regular army is said to consist of 150,000 men, obtained by drafts from the various provinces. This number can be further increased by large numbers of irregular troops and by the territorial army. The regular army is supposed to be entirely a mounted force, but this may be deemed a theory rather than a fact. Since the defeat of the Italians at the battle of Adowa (March 1, 1896), many of the Abyssinian troops are armed with Gras and magazine rifles captured from the Italians. They possess in addition seven batteries of artillery and machine-guns taken in the same battle.

AFGHANISTAN. The Afghan army was originally the creation of Shere Ali, who, on his return from India in 1869, organized the army on what was practically a European basis. After considerable neglect, the army was reorganized by Abd-ur-Rahman, and consists of a regular force of about 44,000 men, which includes 7000 cavalry and 360 guns. No reliable statistics can be obtained regarding the regular army, and none at all regarding the local levies and the tribesmen of the feudal nobility. The Afghan is a brave soldier, inured to hardship and accustomed to the style of fighting demanded by the physical features of his country. He would be an important factor in the event of hostilities between England and Russia. Ordnance is manufactured at the Kabul Arsenal under the supervision of English engineers.

ARGENTINE REPUBLIC. The regular army consists of 1340 officers and 7297 rank and file. According to a statement presented to Congress in 1897, the total effectives should be 29,513 officers and men. The National Guard is stated to include 471,912 men, all told, the majority of whom receive some little training. Citizens of 20 years of age are mobilized every year and receive two months' drill in camp, as the result of an obligatory military service act passed in 1901.

AUSTRIA-HUNGARY. Since 1866 the armies of Austria-Hungary have been organized on what is practically a Prussian basis. The dual character of the Austro-Hungarian monarchy has greatly influenced the formation of the imperial army, since each State enjoys its own peculiar constitution and system of representation. Military service is universal in both Austria and Hungary. The forces are organized into the regular or common army, which may be reinforced by the Austrian Landwehr and the Hungarian Honvédség, followed by the levy-en-masse of each State. Both common army and auxiliaries possess each an *Ersatz*, or supplementary reserve. The imperial ministry of war is the supreme nucleus of the entire military power. It is divided into 4 sections, which comprise 15 departments, and in which are united the different branches of the personnel of the organization, distribution of troops, administration, etc. Bosnia and Herzegovina are organized similarly to Austria and

Hungary. The yearly contingent of recruits for the common army from Austria is 59,211; Hungary, 43,899; total, 103,100. There is also a yearly contingent for the Landwehr — from Austria, 10,000; from Hungary, 12,500—total, 22,500. The approximate total of the armed strength of the Empire on war footing is 45,238 officers, 1,826,940 men, and 281,886 horses. If the levy-in-mass is taken into service, the number would be over 4,000,000. The infantry is armed with the Mannlicher magazine rifle. The following table gives the statistics of the actual strength of the imperial army on peace footing for 1901:

	Total all ranks.
Common Army—	
Infantry	188,585
Cavalry	47,796
Artillery (Field and Fortress)	35,441
Pioneers, Train and other Corps	32,471
Austrian Landwehr—	
Infantry	25,364
Cavalry	2,365
Hungarian Honvédség—	
Infantry	23,235
Cavalry	4,621
Total	359,878

Belgium. This former battle-ground of Europe is better protected by the mutual suspicion and distrust of the great powers than it ever could be by its army, which in 1902 consisted of 29,709 infantry, 6140 cavalry, 9315 artillery; gendarmerie and other corps, 6388; total, 51,552 peace strength. In time of war these numbers would be augmented to about 143,000 men. In addition to this force, there is a "Garde Civique," which, however, is active only in fortified places and communes of over 10,000 inhabitants. It consists of about 41,000 men.

Bolivia has a total of 82,560 officers and men, divided between standing army, depot corps, ordinary and extraordinary reserves, and territorial guard. The standing army is placed at 2560 men.

Brazil. Military service is compulsory, but up to 1902 the conscription law had not been enforced. The army consists of about 15,000 men, which is less than half of its strength on paper. The gendarmerie strength is placed at 20,000 men.

British Empire. Through all the history of the struggle of the English people for political freedom, few greater epoch-making events have occurred than the passing by Parliament of the Bill of Rights in 1689, which forbade the existence of a standing army in time of peace without the consent of Parliament. This gave to the people the permanent control of a factor which might easily have been used for their oppression or to the national disadvantage. Parliament maintains another important check, in the shape of the Annual Army Bill, an act passed at the commencement of every session, investing the crown with powers to make regulations for the government and discipline of the army under what are known as the Articles of War. Administrative control is vested in a secretary of state for war, to whom the heads of all departments are responsible in the discharge of their duties. The commander-in-chief, adjutant-general, quartermaster-general, inspector-general of fortifications, inspector-general of ordnance, are the heads of the principal departments, and constitute a board, which, under the presidency of the commander-in-chief, reports on proposals for any estimates which the secretary of state may desire to lay before Parliament, on promotions, appointments, or other matters connected with the service. The War Office Consultative Council is composed of these officers and such other additional military officers as may be required by the measures under discussion, with the secretary of state as president. The army estimates for 1901-1902 described the regular army of the United Kingdom, exclusive of India, up to the year ending March 31, 1902, as consisting of 9745 commissioned officers, 1485 warrant officers, 19,604 sergeants, 4533 drummers, trumpeters, etc., and 184,433 rank and file, a total of 219,800 men of all ranks. In addition to these numbers, the war in South Africa and the expedition to China raised the number serving under arms in 1901 to a grand total of 450,000 men. Enlistment is voluntary, and extends over periods ranging from three to seven years with the colors and five to nine years in the first-class army reserve, with the great possibility, according to the Army Reorganization Bill of 1902, of the length of service in the active army being considerably reduced, and correspondingly lengthened in the reserve. The auxiliary forces are represented by the militia, the yeomanry, and volunteers. The estimates already quoted give the numbers of all ranks in the regimental establishments of the various forces as 971,970 officers and men.

In the regular active army there were 14,270 cavalry, 39,642 artillery, 10,131 royal engineers, and 118,943 infantry; 14,435 colonial corps, 2820 departmental corps, 7074 army service corps, 3596 medical corps, 973 miscellaneous details, 1038 general departmental staff, making the total of 219,800 already quoted as serving in the regular army of the United Kingdom. The British army alone, of all the great armies of the world, has been tested in a war conducted on a large scale and under absolutely modern conditions, with the result that the rank and file proved themselves fully equal to all demands, as well as to their best traditions. The nation was not so fortunate in its commissioned ranks, but this was due to the system rather than to the material. No service in the world offers so many opportunities for the accumulation of knowledge and practical experience of all that concerns the science of war; but unfortunately for England, this is largely nullified by a system which leaves too much to the choice of the individual officer. It is generally admitted that social demands and the pleasures of the civilian enter too much into the life of the average army officer of ample means, who, in many instances, has never taken up the profession of arms as a serious occupation, and generally retires on marriage or on entry into the ranks of landed proprietors. The pay of a British officer is merely nominal, and not in any way commensurate with his position, or even with his actual living expenses, which fact of necessity limits the class from which officers are drawn. The experience gained in the Boer War of 1899-1902 brought to light much that had been detrimental to the service, and made necessary the Reorganization Bill of 1902 and the proposed changes in the military educational system, the granting of commissions, and increased inducements both in pay and promotion to the rank and file.

The organization of the active or regular army is as follows: *Infantry.*—There are two establishments, home and foreign, the former being practically the nursery of the latter, in that it trains and prepares recruits, sending them abroad to the foreign sections of their corps or organization, as may be required. The foreign battalion ordinarily consists of 29 officers, 1 sergeant-major, 44 sergeants, 16 drummers, 921 rank and file; total, 1011. The home battalion is of varying strength, consisting of eight companies and a depot staff. They are armed with the Lee-Metford magazine rifle, the magazine containing 10 cartridges. *Cavalry.*—The regiment consists of 4 squadrons, each squadron being divided into 3 or 4 troops. At home the strength is normally 26 officers, 696 rank and file, and 465 horses; abroad, 29 officers, 624 rank and file, 592 horses. *Artillery.*—The royal regiment of artillery consists of horse and field batteries, and garrison and mountain artillery, constituting two distinct branches. Officers and men are no longer enlisted or commissioned to the corps indiscriminately, but are sent permanently to one or the other. Batteries consist of 6 guns, with 5 officers and 170 men. *Engineers.*—The strength of a field company is usually 1 major, 1 captain, 4 subalterns, and 210 rank and file. The distinctive feature of British army organization is the Army Corps, first used in the campaign of Waterloo, which is constituted as follows: Three infantry divisions, each of 2 brigades, and including 3 cavalry squadrons, 9 field batteries, and 3 engineer companies. The proportion of artillery to infantry is about 3 guns to 1000 bayonets, which may be increased to 5 guns per thousand with small detached forces. The infantry brigade is of varying strength and composition, and is usually commanded by a major-general; the infantry division by a lieutenant-general, and an army corps by a general. The field army consists of 3 army corps, and, if possible, 4 cavalry brigades. The whole, consisting in round numbers of approximately 115,000 men. Transport and the management of rations for men and horses are assigned to the Army Service Corps, which consists of 38 companies, and 2 remount companies, which, with their reserve, aggregate a little over 50,000 men. Other corps and departments are the Medical Corps, the Nursing Service, Army Ordnance Corps and Department, Army Chaplain Department; Army Pay Corps; and Army Veterinary Department.

The INDIAN ARMY, which is well organized, comprises 40 cavalry regiments, 133 infantry battalions, 13 artillery batteries and companies, and 24 companies of sappers and miners. Cavalry regiments consist of 4 squadrons, with a total of 10 British officers and 625 native rank and file. Infantry regiments have 8 companies, with 9 British officers and about 900 rank and file. Artillery batteries have six guns, with 4 British officers and 256 rank and file. The scheme laid down after the Indian Mutiny of 1857 was a proportion of not exceeding two natives to one European in cavalry and infantry, while practically all the regular artillery was European. Up to 1902, these proportions were fairly maintained. There are serving in India, including British troops, volunteers, native army reserves, and Imperial service troops, a total of nearly 300,000 men. This is exclusive of the large armies of many of the semi-independent native States, which are often well drilled and equipped, and generally under the command and instruction of British officers.

BULGARIA. Military service begins at the age of 20 in time of peace and at 18 in time of war, and continues until the age of 45, those excused for physical or other infirmities paying a special tax for ten years. About 40,000 are liable for service annually, of whom 18,000, decided by lot, are called under arms. The remainder serve in the reserve army for three months annually during the first two years, and then are placed for nine years in the active army reserve. The military academy is at Sofia. The infantry is armed with the Mannlicher repeating rifle.

CHILE. Since 1900, military service has been compulsory, citizens from 20 to 45 years of age being liable; in the first year for nine months with the colors; the following nine years in the first reserve, and until 45 years of age in the second reserve. The active army in 1901 consisted of 17,385 men, of whom 11,500 were recruits and 5885 instructors, etc. The army organization comprises 10 generals, 18 colonels, 44 lieutenants, and 806 inferior officers.

CHINA. An accurate estimate or characterization of the Chinese military forces is impossible. The Black Flags, a remnant of General Gordon's Taiping army, who have been trained by European officers, may possibly at times have numbered 50,000 men. The Eight Banners, a force said to consist of about 300,000, is formed of the descendants of the Manchu conquerors and kindred tribes, of whom from 80,000 to 100,000 are supposed to be kept on a war footing. With the Ying Ping or national army, mercenary troops, Mongolian, and other irregular cavalry, the total strength of the army on a peace footing might be approximated at about 300,000 men, and at about 1,000,000 on a war footing. There is absolutely no organization, the army being without unity, cohesion, discipline, or knowledge of the art of war. They have few weapons of any value; many of the supposedly best troops being armed with weapons long since obsolete. Since the transformation in Japanese military affairs, China has been slowly realizing her antiquated and defenseless condition, and is now sending detachments of officers to study modern methods in the Japanese military academies. These measures, together with the experience gained in the international complications culminating in the advance on Peking in 1900, will undoubtedly result in modernizing the Chinese methods and organization. Acknowledged experts in military affairs all agree on the latent possibilities of the Chinese soldier: his splendid endurance, sturdy physique, and utter disregard of suffering or death.

COLOMBIA. Compulsory military service with a fixed peace footing of 1000 of all ranks.

COSTA RICA. Peace footing, regular army 600; militia 12,000. War footing, 34,000, every male between 18 and 50 years of age being compelled to serve.

DENMARK. Service is obligatory. Able-bodied men from the age of twenty-two serve eight years with the colors and eight in the reserves. The annual contingent numbers about 7900. The peace strength in 1901 was given as 824 officers and 8945 men; and the war strength as 1448 officers and 60,138 men.

ECUADOR. Regular army, 3341 officers and men; National Guard, about 30,000.

EGYPT. The present Egyptian army was organized in December, 1882, by a British general officer under the title of Sirdar. The army consists of a little over 18,000 men, with whom there were serving in 1901 about 134 English officers. About 4500 British troops are permanently garrisoned in Egypt, to meet the cost of which the Egyptian Government is required to pay £87,000 annually.

FRANCE. Since her disastrous war with Germany, 1870-71, France, with excellent effect, has put her military house in thorough order, greater heed having been paid to organization and efficiency and less to numbers. (See MOBILIZATION.) Every Frenchman is liable to carry arms, substitution and enlistment for money are forbidden, and every man not absolutely unfit for military service and between 20 and 45 years of age may be called upon to enter the standing army or reserves. The yearly drafts serve three years in the active army, ten in active army reserve, six in the territorial army, and six in the territorial reserve. Any soldier who qualifies in his duties and passes the educational test may apply for indefinite furlough at the end of one year's actual service. The number of men actually liable for service is estimated at 4,350,000, of whom fully 2,500,000 would be available. The army of France was more formidable at the beginning of the Twentieth Century in numbers, efficiency, and *morale* than at any time in the history of the country. In times of peace, manœuvres on a magnificent scale are periodically undertaken, and every advantage of improved military science and inventions speedily appropriated. The artillery arm is receiving special attention and cultivation (see FIELD ARTILLERY), the general supposition being that France has improved types of guns and carriages not generally known. In many respects the French army is France itself, and formidable for that reason alone; and in point of military efficiency it is little, if at all, inferior to that of Germany.

The interior organization of the French army is as follows: *Infantry.*—The peace strength of the battalion is 14 officers and 506 rank and file; in war, 18 officers and 1050 rank and file. Most infantry regiments consist of three battalions. *Cavalry.*—Regiments are made up of 5 squadrons, each one of which has 5 officers and 140 rank and file, which in war is increased to 155 rank and file. There are 89 regiments of regular cavalry. *Artillery.*—Artillery regiments are divided into divisional and corps, the former having 12 field batteries and the latter 9 field and 3 horse batteries. Batteries have from 4 to 6 guns, with an average of 150 rank and file and 4 officers. *Engineers.*—There are 5 regiments of 3 battalions and 1 regiment of 4 battalions besides 1 company of engineer train. The average company has 4 officers and 160 rank and file. The infantry brigade consists of 2 regiments of 6 battalions or 24 companies, the cavalry brigade of 2 regiments or 8 squadrons with 6 guns. A division consists of 2 brigades of infantry, 1 squadron of cavalry, 6 batteries of artillery, 1 company of engineers, and other corps. Cavalry would be assigned to it according to its needs.

According to returns published in 1902, the strength of the French army was as follows:

	Officers.	Total, all ranks.
General Staff, Administration, Train and details	7,305	35,931
Infantry	13,541	372,321
Cavalry	3,914	69,514
Artillery	3,836	73,736
Engineers	534	13,204
Gendarmerie	629	21,745
Garde Républicaine	83	2,993
Grand Total	29,842	589,444

GERMANY. The King of Prussia is the head of the German army by right of his position as Emperor of the German confederated nations. In war time his authority is supreme and absolute; but in times of peace Bavaria, Saxony, and Württemberg still retain considerable local control. The Imperial War Office under the Prussian war minister discharges all the real military functions of the Federation, except in the three kingdoms mentioned, which still have war ministers of their own. As a matter of fact, the military budgets of Saxony and Württemberg are prepared in Berlin; even Bavaria receives instructions from there as to the quota of men, supplies, etc., which will be demanded of it. Under the constitution, all German troops (with the exception of the Bavarians, who do so only in time of war) are obliged to take the oath of fidelity to the Emperor, swearing obedience to him unconditionally in peace and war.

Liability to military service commences with the end of the seventeenth year of age and continues to the end of the forty-fifth year; the period being divided between active service and service in the Landsturm. Active service may be in the standing army or its reserve, the Landwehr, or the *Ersatz* reserve. In the cavalry and horse artillery the service is three years with the colors and four with the reserve. In infantry and kindred branches, two years are spent with the colors and five with the reserve. On the expiration of this period most of the men serve five years in the first levy; the remainder of the time of active service being passed by all arms in the second levy. All men excused from active service for physical or special reasons, as well as men temporarily unable to serve, spend twelve years in the *Ersatz* reserve. According to the army organization of 1902, the members of the *Ersatz* reserve are largely employed in the administrative and medical branches of the army. The Landsturm can only be used in case of invasion or for purposes of home defense, and has not been employed on active service since the Napoleonic wars. At a crisis, or after long exhausting wars, it would be employed to fill up vacancies in the regular army, as in the instance of the closing days of the Franco-Prussian War. The Landsturm is divided into two levies, to the first of which are assigned men until March 31 of their thirty-ninth year; the remainder constituting the second levy. Besides these divisions there are two other classes known as the one-year volunteers; and the two-, three-, and four-year volunteers. (See VOLUNTEERS.) The first-named are well-educated young men, serving at their own charge and supplying their own horses. At the end of one year's service they are transferred to the reserve. Two-, three-, and four-year volunteers are men desirous of adopting the army as their profession, who volunteer for either of these periods and then reengage. The vast majority of the under officers of the army are recruited from this class. There are no public official statistics of the German army on a war footing, but it is popularly supposed that in the last extremity the present organization would supply a war strength of over 3,000,000 trained men. The ideal of Frederick the Great has never been effaced; and at the beginning of the Twentieth Century, the German army was universally conceded to be unequaled in point of organization, discipline, training, and general efficiency. The rank and file possess the highest educational standard in Europe, while the army as a whole is particularly distinguished for the national spirit which pervades all ranks. The German officer is educated technically to a point of efficiency excelled in no other nation and approached nowhere in Europe unless it be in France.

The organization in detail, is as follows: *Infantry.*—The normal establishment is as follows: A company consists of 4 officers and 145 rank and file. There are 4 companies to a battalion and 3 battalions to a regiment. Two regiments constitute a brigade. *Cavalry.*—There are 93 regiments of regular cavalry, each with 5 squadrons. There is little, if any, difference between the peace and war strength of squadrons, which is given as 5 officers, 150 men, and 165 horses. *Artillery.*—There are 105 regiments organized in brigade divisions of 3 batteries each. The horse artillery is divided into 20 brigades of 2 batteries each. In all, there are 500 batteries, of which 47 are horse and the remainder field. Batteries at war strength consist of 6 guns with 5 officers and about 170 rank and file. In 1901 the artillery was in process of reorganization as to men and matériel. The following summary includes the aggregate number and general divisions of the German army on a peace footing in 1901:

Branch.	Officers.	Rank and File, including Special Service Officers.	Total.
Infantry (all branches)......	13,393	387,342	400,735
Cavalry (all branches)......	2,433	67,674	70,107
Artillery (all branches)......	3,955	89,370	93,325
Pioneers, Trains, Special and Staff Corps.............	4,364	35,637	40,001
	24,145	580,023	604,168

Greece. The armies of Greece are divided among three military districts (namely: the Athenian, the Thessalian, and that of Epirus). Liability to service commences with the twenty-second birthday, the nominal service being as follows: Two years in the active army, and ten in its reserve; followed by eight years in the territorial army and ten years in the territorial reserve, making a total period of thirty years. Practically, cavalry alone serve their full time in the active army. The territorial army and its reserve exists only on paper unless called for war, when it is estimated that the entire army strength would be fully 82,000 men, and the territorial army, 96,000. The peace strength consists of 1876 officers and 19,203 rank and file.

Guatemala. Regular army, 7000 officers and men; effective army, 56,900 men; reserve, 30,000. Availability for service is from 18 to 50 years of age.

Haiti. The army, including the guard of the Government, numbers between 7000 and 8000 men.

Italy. The King is the constitutional head of the army, limited by the required indorsement of his actions by a minister responsible to Parliament. All citizens between 20 and 39 years of age are liable to service in either the standing army, mobile militia, or territorial militia. A great majority of the two latter divisions receive little or no training. The struggle of Italy to maintain the standing of a first-class power, with the limited financial resources at its command, makes the army a tremendous burden to the general population, and prevents entirely any high degree of general efficiency. The official statistics of the army for June, 1900, are as follows:

	Permanent Army.		Militia.	
Description of Service.	Under Arms.	On Unlimited Leave.	Mobile.	Territorial.
Officers (all branches).....	13,863	11,997		10,381
Infantry—Including Carbineers, Bersaglieri, Alpine Troops, Military Districts and troops unassigned	177,894	337,410	231,437	2,018,811
Cavalry	22,342	28,738	....	52,492
Artillery	31,435	80,483	46,891	70,378
Engineers	8,812	21,211	12,592	17,585
All other corps and details............................	9,338	24,413	16,776	63,371
Total troops...........	249,821	492,255	307,696	2,222,637
Including officers......	263,684	811,948		2,233,018
Grand total	3,308,650			

Japan. Service is compulsory with all males between the ages of seventeen and forty years, who are required to perform the following service: Standing army, three years; standing army reserve, five years. All males between seventeen and forty, not serving in either of the armies mentioned, are included in the national army or Landsturm. On December 31, 1900, the army consisted of 8046 officers, 158,214 men; including the reserve, Landwehr, first and second depots, the grand total was 632,007. It is entirely a product of recent times and is destined to be a leading factor in shaping the policy and future of the Orient. Early in 1902 a formal treaty of alliance was entered into with Great Britain which has made the military strength of Japan a practical factor in European politics. The army is organized on the German basis; German officers have been employed, and this, together with the ready adaptability of the Japanese soldier, has resulted in the creation of one of the most effective armies of modern times. Modern methods and machinery have been installed and nearly all the arms and ammunition, great and small, come from Japanese arsenals and manufacturing establishments.

Korea. Between 15,000 and 20,000 men, trained by Russian officers, constitute the standing army of Korea. The Russian instructors have now retired, but native officers trained in their methods carry on the work.

Liberia. The regular army consists of about 1000 men with a militia and volunteer force of about 500. The period of liability for service is between 16 and 50 years of age.

Mexico. In peace time the army consists of 32,143 officers and men; and in time of war between 144,000 and 148,000 officers and men. Service is from the twentieth to the fiftieth year.

Montenegro. Every inhabitant not physically incapable is trained as a soldier and is liable for service at any time. The number of trained men is given as 35,870 infantry, and 856 artillery. Officers are educated in Italy.

Morocco. The army consists of about 10,000 trained infantry and 400 cavalry. There are also a few batteries of field guns and about 2000 irregular cavalry. In addition, there are about 8000 militia cavalry and 10,000 militia infantry. In the event of war, about 40,000 more men could be brought together; the trained troops are instructed by a few officers of various European nationalities.

Netherlands. The Dutch army is organized for home and colonial service. The home army is designed to guard the Amsterdam Position, which covers the capital, and also to garrison the New Holland Water Line, which protects the wealthiest and most important parts of the country. The army is formed partly by conscription and partly by enlistment, volunteers being in the minority. On June 1, 1900, the total strength of the army was 1911 officers and 25,762 men. On war footing it consists of 68,000 men, excluding officers.

Nicaragua. The regular army consists of 2000 men; reserve, 10,000; National Guard, 5000.

Norway. See under Sweden, below.

Paraguay. The army is practically an armed police, and consists of 82 officers and 1500 men.

Persia. The standing army does not exceed 25,000 all told; although nearly 54,000 are annually liable for service. Army organization is by provinces, tribes, and districts, the commanding officers being usually chiefs or leading men of the tribe or district from which the regiment is drawn. According to official returns of the minister of war, the army numbers 105,500 men.

Peru. The army on a peace footing consists of about 3400 men and a police force numbering between 2000 and 3000 men. There is a military school at Chorrillos, near Lima.

Portugal. This army is recruited partly by voluntary enlistment and partly by conscription, under which all young men of twenty-one years of age are, with certain exceptions, obliged to serve. It consists in time of peace of 1868 officers, 31,578 men, 6479 horses and mules, and 160 guns. Its war strength is 4056 officers and 171,324 men, with 336 guns.

Rumania. The regular army is divided into permanent and territorial divisions, each with a reserve; the militia and the *levée en masse*. Every Rumanian from his twenty-first to his forty-sixth year is liable to military service. In time of peace the army consists of 60,388 men in the permanent division, and 72,000 men in the territorial division. The war strength is placed at 3948 officers and about 170,000 men.

Russia. Since 1874, every male, with the exception of residents of outlying districts, has been liable to military service from the beginning of the twenty-first to the end of the forty-third year. Special laws govern the military service of Cossacks, Asian immigrants, and Caucasian Mohammedans. In the standing army, from four to five years is the period of service, and thirteen years in the militia reserve. Young men of good education are released from the regulation period of army service under somewhat similar conditions to those of the one-year volunteers of Germany. About 1,200,000 men are annually liable to service; but the law permits many exceptions, and of the number who should join the forces each year, little more than half actually do so, which leaves a vast reserve of men with little or no training. The peace strength of the Russian army is almost as little known as its war strength. As a matter of fact, the probabilities are that the peace strength in many parts of the Empire is above that given in many published reports. Von Löbell, the German statistician and military historian, gives the total peace strength as at least a million, and the war footing as nearly 5,000,000 men. The Empire is divided into thirteen military districts under high general officers. For mobilization purposes these are again subdivided into twenty-three localities and the localities into circles. The organization comprises field troops, reserve troops, depot troops, fortress troops, local troops, and the imperial militia. The Russian officer is drawn almost exclusively from the governing ranks of society, and is by birth, training, and environment admirably adapted for his profession. The common soldier has many splendid qualities from the military point of view; among which may be enumerated great endurance, natural stoicism, implicit obedience and fidelity, and general indifference to death. Stolidity and general ignorance, however, constitute a great weakness, particularly when opposed to an enemy possessing the quick, alert, and resourceful intelligence demanded of the modern soldier. Infantry and rifle regiments are armed with a small bore, five-cartridge, magazine rifle: the heavy cavalry being similarly armed. Field and mountain artillery of the active army are supplied with steel breech-loaders of four different patterns. The following statement gives approximately the various divisions of the army: An infantry regiment consists of 70 officers, 1867 men; in war, 79 officers and 3945 men. There are 52 infantry divisions, 23 rifle brigades, 25 separate infantry brigades, 10 separate rifle battalions, 8 separate infantry battalions, 21 separate fortress regiments, and 12 separate fortress battalions. An infantry division consists of 2 brigades; a brigade of 2 regiments; a regiment of 4 battalions, and a battalion of 4 companies. The Cossack infantry consists of 6 Kuban battalions. (See article Cossacks.) The regular cavalry is divided into 4 and 6 squadron regiments, the latter consisting of 38 officers and 1071 men, which in time of war is decreased to 36 officers and 948 men. There are 24 divisions, 5 brigades, 7 separate regiments, and 3 double squadrons of cavalry; 2 divisions of the guards, 17 divisions and 2 brigades of dragoons, and 6 divisions of Cossacks. Field artillery consists of 4 gun batteries in time of peace and 8 in war. Horse batteries have 6 guns in peace and war. Mortar batteries have 6 mortars each. The artillery consists of field, horse, guard, grenadier, and line brigades of batteries. There are 29 sapper battalions of engineers.

Salvador. Regular army, 4000 men; militia, 25,000.

Santo Domingo. No statistics are available. The army, which is small, consists of infantry, cavalry, and artillery; a regiment being stationed in the capital of each province.

SERVIA. Military service is compulsory from the age of 21 years; two years being spent in the army, eight in the reserve, and twenty in the national militia. In 1902, the total strength of the mobilized regular army and reserve was given as 160,751. Theoretically, the war strength of Servia, including the militia, is about 354,000 men, but it is probably only 300,000.

SIAM. There is no armed militia, every man being liable for service as required. The standing army consists of about 5000 men, but between 10,000 and 12,000 could be mobilized in a very short time.

SPAIN. Every Spaniard past the age of 19 is liable for service; although exemption may be purchased by payment of 1500 pesetas. The army strength in 1901-02 was as follows:

	Peace.	War.
Infantry	50,273	132,000
Cavalry	13,498	17,156
Artillery	13,571	12,166
Engineers	4,536	11,027
Other corps and details	35,896	11,623
	117,774	183,972

SWEDEN. For a period of five years from 1902, the Swedish Army is to consist of three distinct classes of troops: (1) The *Varfvade*, or enlisted troops, who serve either two or three years; (2) The *Indelta*, training in which consists of from 200 to 400 days in two years, and annually afterwards for 22 or 23 days' drill; (3) The *Varnpligtige*, or conscription troops, who are secured by annual levy. The total peace strength, exclusive of the conscripted troops, is 37,200 officers and men.—NORWAY. The army of the country is secured largely by conscription, although a small proportion voluntarily enlist. Conscription is from the twenty-second year of age, service being in either the line, the *Landvaern*, or the *Landstorm*, or final levy. In time of war nearly 82,000 trained men would be available; but the number actually under arms can never exceed 18,000 men without the consent of the Storthing.

SWITZERLAND. The Army of Switzerland is practically a militia, every citizen being liable to military service and receiving occasional training. The following table gives the divisions and numbers of the armed forces of the country for 1901-02:

Elite (men from 20 to 32 years of age)	151,766
Landwehr (33d to 44th year)	87,943
Landsturm (all citizens not already serving)	278,556
Total	518,265

TURKEY. Every Mussulman over 20 years of age is liable to military service for a period of twenty years. Non-Mohammedans are exempted on payment of a tax, the equivalent of about $1.50. The army is divided into seven districts, with which are associated seven army corps. The entire Turkish Army organization is defective and exceedingly corrupt. The troops are scantily fed and clothed, badly equipped; and with pay invariably in arrears, discipline is naturally at a discount. Yet the natural qualities of the Turk as a fighting man have become proverbial, and are historically justified. His racial characteristics are greatly reinforced by the militant features of the religion he professes, the head of which is the Sultan. Should the latter in his religious capacity proclaim a holy war, he could command millions of subjects of other empires, which fact, in addition to his own forces, gives him a power that more than anything else has contributed to his present European security. The war strength of the army, permanent, territorial, and reserve, for the year 1901, was stated to be 1,500,000 men, and the peace establishment 700,620.

UNITED STATES. The establishment of the United States Army, according to the reorganization of February 2, 1901, consists of 30 regiments of infantry, 15 of cavalry, and an artillery corps of 126 companies of coast-artillery and 30 batteries of field-artillery; 3 battalions of engineers, hospital corps, signal corps, ordnance department, medical department, quartermaster's department, adjutant-general's department, inspector-general's department, pay department, and subsistence department. The interior organization of units is as follows: *Infantry* regiments have an enlisted strength, including band and staff, of 1284 men; 4 companies constitute a battalion, and 3 battalions a regiment. *Cavalry* regiments contain, with band and staff, 12 troops of 85 men each, making a total of 1056. *Coast-artillery* companies contain 109, and batteries 160 men each. *Engineer* companies contain 104 men, 4 companies constituting a battalion, which, with staff, numbers 418 enlisted men. According to statistics published by the Adjutant-General, October 1, 1901, the strength of the Regular Army consisted of 3278 officers and 81,235 enlisted men, a total of 84,513, distributed as follows:

Station.	Officers.	Enlisted Men.	Total.
United States	1,922	31,952	33,874
Philippine Islands	1,111	42,128	43,239
Cuba	166	4,748	4,914
Porto Rico	51	1,490	1,541
Hawaiian Islands	6	250	256
China	5	157	162
Alaska	17	510	527
Total	3,278	81,235	84,513

This includes 4336 men of the hospital corps and 25 officers and 815 men of the Porto Rican Provisional Regiment. There were also in the Philippines, on the above date, 172 volunteer surgeons, and 73 officers, 4973 men, native scouts. Under the Constitution of the United States, the President is commander-in-chief of the army, the administration of which is in the hands of the secretary of war and of the department of which he is the head. The military establishment is under the orders of the commanding general of the army, so far as pertains to army discipline and control. Fiscal matters are conducted by the secretary of war, through the several staff departments. The commanding general promulgates orders from the President or secretary of war, if relating to military operations, or concerning the military control and discipline of the army.

The Regular Army may be reinforced by additional volunteer regiments at any time, on the authorization of Congress. During and after the Spanish War of 1898, many volunteer regiments of cavalry and infantry were organized, and after being used on more or less active service were mustered out as the circumstances warranted. The period of enlistment for enlisted men is three years. Every able-bodied man may be called on for defense or service in the militia, the number available averaging between 14,000,000 and 15,000,000. Each State of the Union has a militia establishment, under its own State authorities, but subject to supreme Federal authority for Federal purposes. In 1899 the aggregate effective enlisted strength of the State militia, or National Guard, was estimated at 106,339 men, all ranks. Most officers of the Regular Army are educated at the United States Military Academy, West Point, N. Y., and afterwards in the various practical schools of the army. In point of efficiency and thoroughness they are unexcelled. The United States military methods differ from those of European nations, in that individuality is strongly encouraged. This is greatly facilitated by the republican system of national government, the absence of caste or rank of birth, and the general method of education and appointment of officers. In adaptability, resourcefulness, military intelligence, and individuality, the United States soldier is conceded by foreign military authorities to be unequaled. See also section on Army, under United States.

Uruguay. The permanent army consisted in 1901 of 231 officers and 3233 men, armed with the Mauser rifle. The artillery is equally modern, consisting of Krupp, Armstrong, Nordenfeldt, Bange, and Canet guns. In addition to an armed police force of 3200 men, there is a national guard of about 97,000 men.

Venezuela. In 1901 the army was said to consist of about 9000 men. It is distributed throughout the Republic in federal garrisons and on ships of war. There is a national militia, but its strength is not known; it is estimated at between 60,000 and 100,000 men.

Bibliography. Authorities and statistical reports from which much valuable information on armies may be obtained are: Oman, *Art of War in the Middle Ages* (London, 1885); Jerram's *Armies of the World* (London and New York, 1900); and the *Reports of the Military Information Division* of the War Department, issued by the Government Printing Office at Washington, D. C. The annual issue of the *Statesman's Year Book* (London and New York) contains the latest reliable statistics regarding the armies of the world. Other sources of information are the regular service magazines, and the *Journal of the Military Service Institution* (Governor's Island, N. Y.). For a further treatment of the subject of armies and detailed information as to their organization and principal characteristics, the reader is referred to the articles, Army-Organization; Artillery; Cavalry; Infantry; Frontier, Military; Landwehr; Militia; Military Education; Mobilization; Tactics, Military; and Volunteer, Military. Detailed information on military technical subjects will be found under Ammunition; Ballistics; Engineering, Military; Coast Defense; Fortification; Field Artillery; Ordnance; Signaling and Telegraphing, Military; Small Arms; and also under numerous titles relating to military matters in general. In addition to the special article on Tactics, Military, such specific operations as Advance Guard; Attack; Battle; Engagement, Military; Inspection; Patrol; Marching; Rear Guard; Outpost, etc., will be found under their respective titles.

AR'MILLARY SPHERE (Lat. *armilla*, a ring). An instrument intended to give a just conception of the constitution of the heavens, and of the motions of the heavenly bodies, as seen by an observer on the earth. It consists of a number of rings fixed together so as to represent the principal imaginary circles of the celestial sphere, and these are movable round the polar axis within a meridian and horizon, as in the ordinary celestial globe. It was by means of such rings furnished with sights that Hipparchus, Ptolemy, and other ancient astronomers made many of their observations, and we find even Tycho Brahe making most of his planetary observations with the help of such an instrument. The armillary sphere can now be used only for instruction in astronomy, and even in this respect it is altogether supplanted by the celestial globe.

AR'MIN, Robert. An English actor and writer. He is spoken of in *Pierce's Supererogation* as one of the 'common pamphleteers of London,' but he is chiefly remarkable as having been one of the original actors in Jonson's *Alchemist*. He created the part of Dogberry. He is the author of *A Nest of Ninnies*, published in 1608, and of *A Brief Resolution of the Right Religion* (1590).

AR'MING. See Lead, Sounding.

ARMIN'IAN, or GENERAL, BAP'TISTS. See Baptists.

ARMIN'IANISM. The name given to a school of Protestant theology which arose in the Netherlands toward the close of the Sixteenth Century, taking the name of the leading early representative, Jacob Arminius (q.v.). It consisted at first of a protest against the strict predestinarian doctrine of Calvin and Beza (see Calvinism), but developed gradually into an increasingly liberal theology. The accepted teachers of the Reformed Church, at the time the Arminian movement began, emphasized the importance of unconditional election and a limited atonement. Against these views objection was raised in 1578, when Koornheert, a *secretarius* of Haarlem, began his agitation to secure a simpler doctrinal system. Arminius, who was the most influential preacher in Amsterdam from the year 1588 on, was called upon to refute Koornheert's alleged errors; but while studying the question became himself infected by them. Thus gradually he adopted views at variance with the Calvinistic doctrines named above, and began to teach that God, who knows beforehand how all men will act, decrees their salvation or condemnation accordingly; in other words, that election is conditional. He further taught the universality of the atonement—that is, that Christ offered a sufficient sacrifice for all mankind, although it becomes efficient only for such as have faith and believe in Him. (This should be distinguished from modern Universalism, q.v.).

After the death of Arminius (1609), his followers, to the number of forty-six, presented to the Estates of Holland and West Friesland a 'Remonstrance,' drawn up by one Uytenbogaert, embodying a moderate statement of their views under five articles, which they declared to be 'agreeable to the Word of God' and 'sufficient for salvation.' These articles were substantially as follows: (1) Predestination depends upon God's foreknowledge. (2) The atonement is universal in the sense that all men are salvable. (3) No one can exercise saving faith until regenerated by the Holy Spirit. (4) It is possible to resist the operation of divine grace. (5) It is not certain that all who seem to be called will persevere unto the end. The publication of this remonstrance was met by a 'Counter-Remonstrance' from the Orthodox side, setting forth in five articles the high Calvinism which most of the Dutch churches agreed in maintaining. From these two documents the progressive and conservative parties came to be known as 'Remonstrants,' and 'Counter-Remonstrants' respectively, and from the number of articles in dispute, the struggle is sometimes called the 'Quinquarticular' controversy. In the vain hope of reconciliation, conferences were arranged at The Hague (1611) and at Delft (1613), but without result. The toleration law, issued by the States-General in 1614, was no more successful. It had become clear by this time that the theological question was inextricably interwoven with politics. Hugo Grotius, scholar and diplomatist, and John van Olden Barneveldt, advocate-general of Holland, sided with the Arminians, who supported their republican policy; while the Stadtholder, Prince Maurice, favored the Calvinists, who in turn gave their support to his party of political centralization. No decision upon the doctrinal questions at issue was reached before the meeting of the national synod at Dordrecht (Dort) in 1618.

The Synod of Dort (November, 1618, to May, 1619) is one of the most important councils in the history of the Reformed Church. It bears an international stamp, having been attended by delegates sent from England, Switzerland, the German States of the Palatinate, Hesse, and Bremen. King James, of England, was personally represented by John Hales, 'the ever-memorable,' and an interesting incident of the synod was this man's change of view, when he "forever bade John Calvin good-night." The two opposing parties were led by Gomarus, a Calvinist, and Simon Episcopius, an Arminian. The Orthodox members were largely in the majority, and it soon appeared that the Liberals were there merely to be tried, not to deliberate and consult in equal debate. Episcopius and thirteen other Remonstrants were condemned as heretics and excluded from the synod, which then proceeded to formulate the true faith in a series of decrees, afterwards confirmed by the States-General. Episcopius himself was banished, and some two hundred Arminian pastors were deposed. Proceedings were begun by the civil government against the political leaders who sided with the Remonstrants. Barneveldt had already been executed before the adjournment of the synod. Grotius was condemned to life imprisonment, but escaped after about two years' confinement. The doctrinal decrees of Dort were accepted by the churches in Holland and in France, but they met with some opposition elsewhere. They are still the official standard of the Reformed Dutch Church in America.

After the death of Maurice (1625) the severity of the laws against Arminianism was relaxed, and Episcopius was allowed to return from his exile. The closing years of his life were spent in teaching theology at the new Remonstrant college in Amsterdam (founded in 1630). His successor here was a French theologian, Courcelles, who died in 1659. There followed in turn three eminent Arminian scholars, Limborch (died 1712), Le Clerc (died 1736), and Wetstein (died 1754). Wetstein is noted for his contribution to the cause of biblical criticism, especially for his work upon the text of the New Testament. Arminianism has continued in Holland down to our own time, though without any large numerical following. There are Remonstrant churches in Rotterdam and Amsterdam. The movement put forth its best energy in the period of controversy, upon which, as has frequently been remarked, it seems to have thriven better than upon peace. In this respect it shares the fate of most movements that are based upon protests against some real or fancied grievance. During the Eighteenth Century, not a few Arminians went over to the Socinian or Arian position, discarding more and more of the Reformed system of belief. But, aside from this radicalism, the Arminian influence has been widespread. It passed over into England, and, from the time of Archbishop Laud, controlled the theology of the Established Church, leaving Calvinism to the non-Conformists. It took on new life in the time of Wesley, and, with some modifications, became the theology of Methodism. It is substantially the faith of many Protestants, of other names, who suppose themselves to be Calvinistic. Indeed, it would be a mistake to think of Arminianism as an isolated phenomenon, for it is akin to the teaching of some of the early Greek theologians, to the semi-Pelagianism of the Fifth Century, and to some imputed views of Erasmus. Protestants in general shared in the controversy on the doctrines of Arminianism, and all opponents of Calvinism are still often characterized as Arminians.

Consult: *The Works of Arminius*, English translation, reprinted from the English edition (Buffalo, 1853, 2 vols.); Calder, *Memoirs of Episcopius* (New York, 1837); Scott, *The Synod of Dort* (Philadelphia, 1841); Schaff, *Creeds of Christendom*, especially, vol. i., 508-23, and vol. iii., 545-97 (New York, 1877); Motley, *John of Barneveld* (New York, 1874); Blok, *History of the People of the Netherlands*, part iii., English translation by Putnam (New York, 1900); Dresbach, *Die protestantischen Sekten der Gegenwart* (Barmen, 1888). See also Dort, Synod of.

ARMIN'IUS (B.C. 18-c.20 A.D.). A chief of the Cherusci, a German tribe inhabiting parts of what is now Hanover and Brunswick. He was born in B.C. 18, and passed his early years at Rome. The period of Arminius's youth was a time of great peril for Germany. To secure the frontiers of the Empire against the attacks of the Teutonic tribes, the Romans had advanced into the more turbulent districts and erected a series of strong fortresses. Between B.C. 9 and A.D. 4, Drusus and Tiberius penetrated into the northwest of Germany as far as the Elbe, and reduced the various tribes to virtual subjection. With so much prudence and caution, however, had Tiberius proceeded, that the Germans continued to all appearance on the best terms with the Romans, gradually adopted Roman habits, and frequently took service in the Roman armies. Arminius and his brother Flavius enrolled themselves under the Roman standards, and as leaders of Cheruscan auxiliaries not only obtained

Roman citizenship and the rank of knighthood, but likewise acquired a knowledge of the Latin language, and an insight into the arts of war and policy, as practiced by the Romans. On returning home, Arminius found the people oppressed by the Roman Viceroy, Quinctilius Varus, and conceived the plan of delivering his country from the Romans. All the tribes and leaders as far as the Elbe were secretly united; Varus was lulled into security and induced to scatter most of his forces, and with the remaining portion, which was just on the point of leaving the territory of the Cherusci for the Rhine, to quit the highway for a shorter route across the country. He was thus lured into the impassable districts of the Teutoburg Forest, between the towns of Detmold and Wiederbruck, near the sources of the Ems and the Weser. Arminius, who commanded the rear-guard of the Roman army, fell upon the legions unexpectedly, and annihilated the entire force, A.D. 9. When intelligence of the disaster reached Rome it excited the greatest consternation; but the Germans carried their victory no farther, and for a few years both parties refrained from hostilities. In A.D. 14, however, the Romans pressed once more into Germany. In two successive campaigns, A.D. 14 and A.D. 16, Germanicus reduced Arminius to great straits and took his wife captive, but was recalled to Rome by the Emperor Tiberius, A.D. 17, and the results of his victories were lost. From this time no Roman army ever ventured to penetrate into the interior of Germany. After the expulsion of the Romans, internal feuds broke out with great violence among the Teutonic tribes. In the course of these Arminius was slain by his own relatives about A.D. 20. Tacitus says of him: "Arminius fought with alternate vicissitudes of fortune, and fell at last by the treachery of his own relations; a man of warlike genius, and beyond all question the deliverer of Germany." A colossal statue of Arminius by Bandel was erected on a hill near the town of Detmold in 1875.

Consult: Wietersheim, *Der Feldzug des Germanicus* (Leipzig, 1850); Kemmer, *Arminius* (Leipzig, 1893); and Fischer, *Armin und die Römer* (Halle, 1893).

ARMINIUS, JACOBUS or JACOB HARMENSEN, commonly called ARMINIUS (1560-1609). One of the most influential of the Dutch theologians of the Reformed Church, and founder of the theological system which bears his name. He was born in Oudewater-an-der-Yssel, October 10, 1560, and died in Leyden, October 19, 1609. His father, a cutler by trade, died when Jacob was a child, and the boy was brought up by friends in Utrecht and Marburg. He spent several years (1575-82) at the newly founded University of Leyden, where he imbibed a distaste for the Aristotelian philosophy, which still had great power. Proceeding to Geneva, the Mecca of the Reformed Church, Arminius studied for nearly six years under Beza (1582-87), with the interruption of a few months' stay in Basel (1583), where he heard Grynæus, who became very fond of his gifted pupil. In Basel, Arminius delivered some lectures on his own account, as was the custom with especially promising students, and he would have been rewarded with the degree of doctor, had he not modestly declared himself too young to receive this distinction. At the close of his period of study, Arminius made a trip to Italy, visiting Padua and Rome (1587). During most of his student life he had been supported by the city of Amsterdam, which recognized his promise, and, knowing him to be dependent, had extended to him a sort of municipal patronage.

In 1588 Arminius became preacher of the Reformed Church in Amsterdam, where he remained for fifteen years, with growing fame and influence. His orthodoxy was as unquestioned as his ability, and we find that appeal was several times made to him to defend the Calvinistic system against attacks. In its influence upon Arminius himself, the most important of these controversies was with one Koornheert, of Haarlem, who had attacked Calvin's doctrine of predestination. While studying the question, Arminius began to incline toward similar views himself, and this tendency appeared in his public sermons on Saint Paul's Epistle to the Romans, especially chapters vii.-ix. Yet he always maintained that his opinions were not inconsistent with the doctrinal standards of his Church, the Belgic Confession, and the Heidelberg Catechism. In spite of some opposition on the part of the conservatives, Arminius, in 1603, was appointed professor at the University of Leyden, the great training-school for ministers of the Reformed Church in Holland. His colleague, Gomarus (q.v.), was a stanch Calvinist, and controversy soon broke out between them, which continued throughout the remainder of Arminius's life. This was by no means a mere academic dispute, but rather one in which the whole of Dutch Protestantism was engaged. The chief points on which Arminius differed from the orthodox majority were the doctrines of divine grace and of election. Arminius taught that grace was universal and election conditional. Gomarus taught that grace was confined to the elect, and that their election was not dependent upon God's foreknowledge of their faith or good works, but was merely from God's good pleasure. Disputations were held, but without result. Arminius was charged with holding Pelagian and Socinian views, which latter charge he denied with especial vigor. His position at the university remained secure, for the authorities declined to permit clerical interference. Nevertheless, he was constantly under fire, and repeated attempts were made to bring him to trial before a synod. The struggle was still going on when Arminius died, worn out by the strain of theological strife. His influence, however, was never greater than after his death, and his followers, under the leadership of his pupil Episcopius (q.v.), prolonged the struggle, even through temporary defeat at the Synod of Dort, until religious toleration was secured under Prince Frederick Henry. The details may be found under ARMINIANISM.

The works of Arminius are accessible in Latin and English. Consult: *J. Arminii Opera Theologica* (Leyden, 1629); *The Works of Arminius*, English translation, reprinted from the London edition (Buffalo, 1853).

AR'MISTEAD, GEORGE (c.1780-1818). An American soldier, born at New Market, Va. He entered the United States Army as second-lieutenant in 1799, became a captain in November, 1806, and a major in March, 1813. He was conspicuous for gallantry at the capture of Fort George (Canada), on May 27, 1813, and subsequently distinguished himself and earned the brevet rank of lieutenant-colonel by his defense of Fort McHenry (near Baltimore) against the attack of Admiral Cochrane's fleet, on September 13, 1814.

AR'MISTICE (Fr. *armistice*, from Lat. *arma*, arms + *statum*, supine of *stare*, to stand; for the form *stice*, cf. sol-*stice*). A cessation of hostilities for any period of time that may be mutually agreed upon by the combatants. An armistice is sometimes called after a severe action, to enable both sides to search for and bury their dead; or it may be called as a prelude to overtures for peace. A local armistice may be entered into or arranged between any part of the opposing forces which will only affect the respective commands. A general armistice, affecting all the troops in the field and all operations, can only be entered into by the commanders-in-chief, or their home governments.

AR'MITAGE, Edward (1817-96). An English historical painter. He was born at London; was educated in Germany and France, and was a pupil, in 1837, of Delaroche, whom he assisted in painting the famous "Hémicycle." In 1843, at the Westminster Hall Exhibition, his cartoon, "Cæsar's First Invasion of Britain," gained the first prize. His more noteworthy frescoes are in Saint John's (Roman Catholic) Church in London, and in the Houses of Parliament. He was appointed professor of painting in the Royal Academy in 1875, of which he had become a member three years earlier.

ARMITAGE, Thomas (1819-96). An American Baptist clergyman who was born in Yorkshire, England, and came to America in 1838. At 16 years of age he entered the ministry of the Methodist Episcopal Church, but in 1848 became a Baptist, and was pastor of the Fifth Avenue Baptist Church, New York, retiring in 1889. He was active in the organization of the American Bible Union, and was its president from 1856 to 1875. He was a strong advocate of the revision of the Bible, with a view to bringing out what he thought the correct interpretation of the words which relate to baptism. He published *Preaching: Its Ideal and Inner Life* (1880)—lectures which he had delivered before Baptist theological seminaries—and *A History of the Baptists* (1887).

AR'MOR (through OF. *armure*, *armeüre*, from Lat. *armatura*, armor). In common usage, clothing or coverings worn to protect the body against weapons. (In the English statutes it includes offensive weapons as well.) Among primitive nations the armor ordinarily consisted of the shield alone. Before gunpowder was commonly used, each nation, as it gained greater skill in warfare, adopted other means of defense, in addition to the shield. Skins, leathers, various materials like cloth, metals in many forms, were adopted as protections. The Greeks of the Homeric Age had helmets, cuirasses, greaves, and shields of bronze. The later Greeks used the same pieces of bronze armor, but developed them so as to protect the whole body more thoroughly, and frequently used a corselet of quilted linen, of Oriental origin, in place of the metal cuirass. The shield was smaller than the Homeric shields. The Romans used practically the same armor, but endeavored to develop it along the lines of superior protection and less weight. For part of the body armor they substituted iron in place of bronze. For the cuirass they used frequently leather, on which iron rings were sewed. The shield was of wood, covered with leather, and had a metal rim.

The early Germans had no armor except the shield. From contact with Roman weapons, they learned the necessity for more, and accordingly adopted some of the Roman armor. But for a long period armor was rare and costly. Charles the Great enacted laws repeatedly forbidding the sale of byrnies (q.v.) outside his realm. If any merchant disobeyed, he was to forfeit all his property. Every large landowner had to own a byrnie; and if he appeared without it, he forfeited his benefice. As, in place of national levies, feudal armies became the rule, more stress was laid upon a knight's having a complete suit of armor. The foot-soldiers and attendants were protected mainly by gambesons, but the knight strove to cover every portion of his body with metal armor.

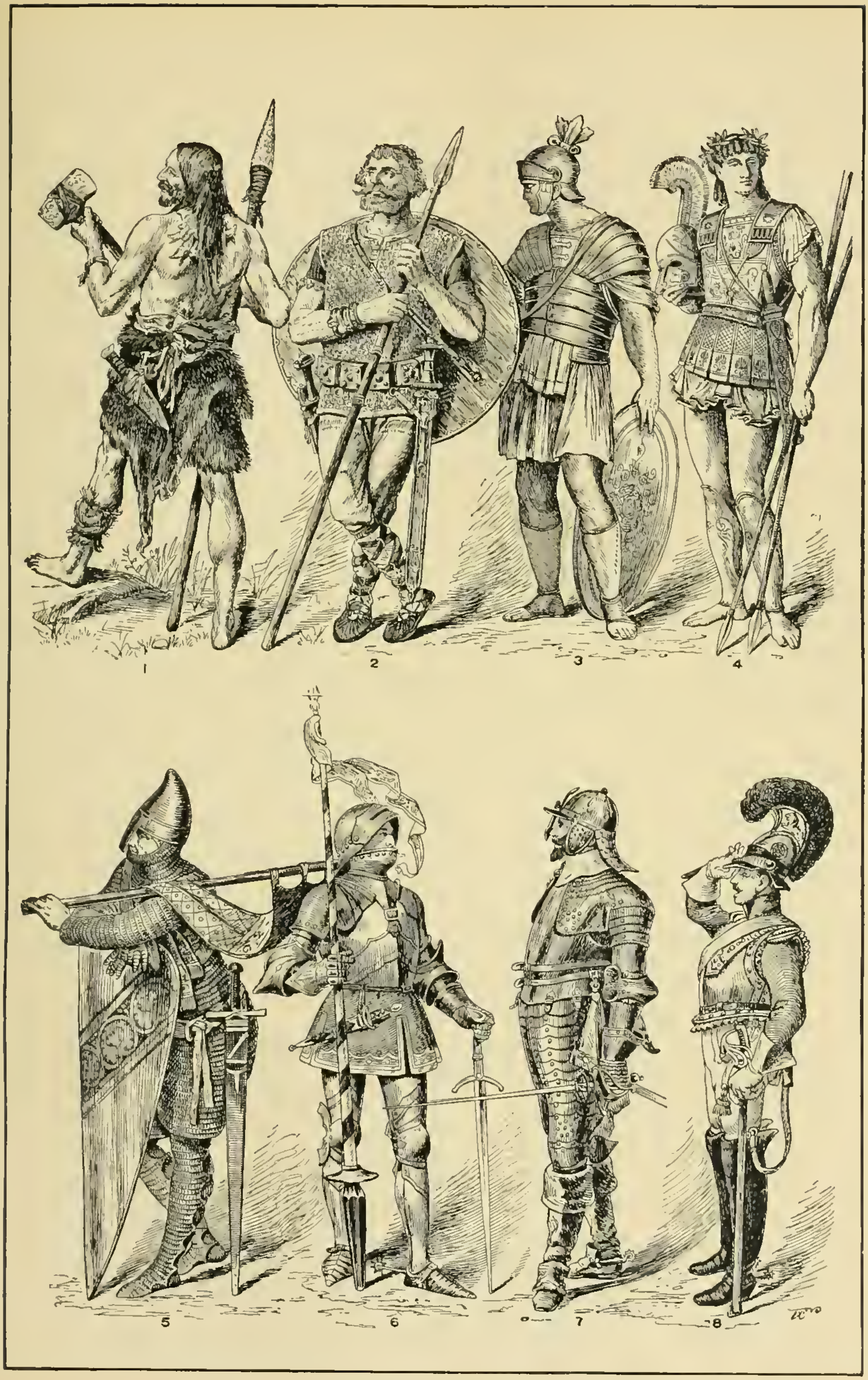
The period beginning with the Twelfth Century, when the use of the crossbow became common and when the Crusaders came into conflict with the armies of the East, is the time in which armor developed most rapidly and became most perfect. For the byrnie was substituted, first, the grand hauberk, and later, in the Fourteenth Century, plate armor. The small, conical-shaped helmet of the Eleventh Century was discarded for a much larger one, cylindrical in form, which covered both head and face. When the visor was down, only a few openings were left for seeing and for getting air. The body also was entirely covered with plate armor. When thus clad a knight was unrecognizable, and this necessitated armorial bearings as a means of identification. The shields were still made of wood, and elm seems to have been preferred. In thoroughly equipped bands of mounted men, the horses were also partially protected by plates of armor.

Armor, by its development, had been able to keep pace with the improved forms of the crossbow and the long-bow. But when gunpowder came into use, armor was of little service. Consequently, it was discarded for the most part, except among the very wealthy, who continued to wear coats of mail as late as the close of the Seventeenth Century, and in certain troops of cuirassiers, some of which still retain in their uniforms traces of armor. Even now some of the helmets worn by cavalry may be classed as armor. After coats of mail were discarded because they were ineffective and cumbrous, buff coats and jerkins were much used for defense.

For this whole subject consult Demmin, *Die Kriegswaffen* (fourth edition, Leipzig, 1898), which contains thousands of illustrations. For the separate pieces of armor, consult the articles: Ailettes; Bard; Brassarts; Breastplate; Brigandine; Byrnie; Chamfron; Chausses; Coat of Mail; Coif; Gambeson, etc. See also Chain-mail.

AR'MORER. Formerly a maker of, or an expert in, armor; hence, one who had the care of the arms and armor of a knight or man-at-arms, and equipped him for action. In modern use the armorer is the custodian or manufacturer of military arms, and has the supervision of any collection or equipment of arms. In the British Army, an armorer is attached to each troop of

ARMOR



1. WARRIOR OF THE STONE AGE.
2. GERMAN SOLDIER OF THIRD AND FOURTH CENTURIES.
3. ROMAN SOLDIER.
4. EARLY GREEK WARRIOR.
5. KNIGHT OF THE FIRST CRUSADE.
6. BURGUNDIAN KNIGHT IN FULL ARMOR (1470).
7. SOLDIER OF EARLY SEVENTEENTH CENTURY.
8. FRENCH CUIRASSIER OF EIGHTEENTH AND NINETEENTH CENTURIES.

cavalry and to each company of infantry to clean the arms. Aboard a man-of-war the armorer and armorer's mate did the blacksmith work of the vessel; but of late years the armorer is a petty officer and one of the gunner's gang, his duties being the care of the arms used by the ship's company. Aboard ship each man is not responsible for the care of his weapon, as is the case with soldiers.

ARMOR'ICA (Celt. *ar*, on or near + *mor*, sea, Lat. *mare*, Slav. *more*; cf. *Pomerania*, Slav., coastland, and *Paramaribo*, the dwelling near the sea). The country of the Armorici, the name by which the people occupying the coast of Gaul between the Seine and the Loire were known to Cæsar. At a later period the name Armorica was confined to the country afterwards styled Britannia Minor, or Bretagne.

ARMORIC LAN'GUAGE. See CELTIC LANGUAGE.

AR'MOR PLATE. The protection of vessels of war by metallic plating began soon after the introduction of heavy guns on board ship, but was a matter of little importance until the introduction of shell-fire and the increased power of guns made the protection afforded by thick wooden sides wholly inadequate. The demand for armor became more imperative as time went on, owing to the greater use of machinery and apparatus which needed protection, even against comparatively small guns; and, in recent years, its use has been further stimulated by the introduction of guns of the rapid-firing types. The first important use of armor plate was made in the operations against Gibraltar in 1782. The Chevalier d'Arçon had caused to be constructed 10 floating batteries of 600 to 1200 tons, armed with 10 to 20 guns each. The hulls were of wood, protected with bars of iron laid on at short intervals, with an outer covering of cork. Sand was placed in the spaces between the bars, and it was to be kept wet to avoid danger of fire from red-hot shot. The deck over the guns was of very solid construction, and covered with thick green hides. At the attack on Gibraltar of September 13, 1782, one of the vessels took fire, and, as they were moored very close together, the conflagration spread to the others, and they were all destroyed. No provision had been made for extinguishing fire, as it was thought the means to prevent it were ample. Boats, even, were not supplied, so that of the 5260 men who formed the crews, only 487 were saved. Subsequent to this were many suggestions as to the employment of armor plating. About 1812, Col. John Stevens, of New Jersey, prepared plans for an armored steam vessel for harbor defense. Explosive shells, which had hitherto been used only in mortars, were in 1824 prepared for service in the ordinary smooth-bore guns of the French ships; and at that time General Paixhans, in an official letter to the French Government, predicted that this new departure would force the creation of armored ships. About 1830 the French Government began experiments (the first were carried out at Metz) to determine the resistance of earth, wood, and different types of masonry to the penetration of spherical projectiles. These experiments were continued at intervals for several years, and the results obtained are still considered of some value.

In 1841, General Paixhans, who invented the shell for low-angle fire, recommended the application of armor plate to the sides of vessels as a protection against his own missiles. His plans were rejected, but they attracted much attention. In 1841, also, the sons of Col. John Stevens proposed to the United States Navy Department to build an ironclad steamer of high speed, in which all of the machinery, including the propellers, was to be below the water-line. The proposal was accepted, and the act of Congress, approved April 14, 1842, authorized the Secretary of the Navy to "contract for the construction of a war steamer, shot and shell proof, to be built principally of iron, upon the plan of the said Stevens." The Stevens brothers had been carrying on armor experiments of their own, and as a result of them had decided that a thickness of 4.5 inches would be sufficient to render the new vessel invulnerable. Just as the Stevens ship was about to be commenced the performances of John Ericsson's large wrought-iron gun showed that 4.5 inches of laminated armor was insufficient for the purpose in view, so that when the Stevens battery was finally begun in 1854—two months before any armored craft in Europe had been laid down—it was as a larger vessel than that originally designed, in order to carry armor of 6.75 inches. The Stevens battery was never completed, largely because general interest in the project subsided, but specifically because Congress refused further appropriations.

In 1841 Theodore R. Timby submitted to the United States War Department plans for a revolving armor-plated battery, and in 1843 he filed a caveat for "a metallic revolving fort, to be used on land or water, and to be revolved by propelling engines located within the same, and acting upon suitable machinery." In 1845 M. Dupuy de Lôme submitted the plans of an iron-hulled armor-plated frigate. He believed that by substituting iron for wood he could reduce the weight of the hull from 42 per cent. of the displacement to 23, and this saving would be sufficient to give the ship an armor belt 8 feet wide and 6.5 inches thick. The plans were rejected on the ground that he had overestimated the weight which would be saved, that, even if the proposals were feasible, a 6.5-inch belt was not invulnerable, and that, moreover, the battery was left without protection. In 1846, the French constructors were called upon for plans of an armored floating battery for coast defense. One of these provided for an iron hull and was at first accepted, as the light hull permitted an increased thickness of armor, but it was finally rejected on account of the anticipated deterioration and loss of speed from the fouling of the bottom. No steps were taken to build any of the batteries at this time; but at the outbreak of the Crimean War the plans of the batteries were again taken up and experiments with armor were begun at Vincennes to determine what the proper kind should be. These tests resulted in showing the inferiority of laminated plating as compared with solid plates of the same thickness. Solid plates 4 inches thick were broken, but not pierced, by both 32-pounder solid shot and 8-inch and 9-inch hollow shot. It was therefore decided to armor the batteries with 4.5-inch plates. About 1846 or 1847, Lieutenant Hunter, of the United States Navy, brought out a plan of an armor-deck for the protection of the machinery of vessels, and it very closely resembled, in all its features, the protective deck of thirty years later. In September, 1854, the French Government began the construction of several of the armored floating batteries fitted with weak auxiliary steam-power, for which designs had been prepared some years before. Three of them took part — the principal part — in the attack upon the Russian batteries at Kinburn, October 17, 1855. While practically uninjured themselves, they were able to lie so close to the enemy's works, 800 yards away only, that they dismounted nearly half his guns and compelled him to surrender after four hours' firing, though these batteries had held at bay the combined wooden fleets of France and England for months. The plans of these armored vessels were sent to England by the French Emperor. After considerable opposition and delay the Admiralty began the construction of similar vessels, but they were completed too late to join in the attack on the Kinburn forts, as they did not reach the Crimea until October 24, seven days afterwards. The success of the French armor-clads was followed at once by renewed and widespread interest in the armoring of ships. The French Conseil des Travaux de la Marine then determined to construct some sea-going armor-clads. Before elaborating a design, further experiments were made with armor plates, which resulted in the adoption of armor five inches thick. The thickness of plating and the general features of the design having been decided upon, plans were invited. Those of constructor Audenet were accepted, and were carried into effect by the building of the *Couronne*. In the meantime, M. Dupuy de Lôme had been studying the results of the recent armor trials. In November, 1857, he laid his plans and proposals before the Government, and in March, 1858, was begun the conversion of the 13-knot, 5000-ton wooden line-of-battle ship *Napoléon* into an armor-clad. The armor was applied very liberally, extending from well below water to the deck above the battery; the water-line belt being 4.75 inches thick, backed by 26 inches of oak, and the armor of the battery 4.5 inches thick with 24 inches of backing.

With the armor trials for the plating of the batteries used at Kinburn, in which the superiority of the solid plate was shown, the steady development of armor commenced. Before the application of armor to sea-going ships, which began with the *Couronne* and *Gloire*, the investigation of its qualities naturally lacked impetus, but henceforward its improvement was steadily sought, and its manufacture soon became a separate industry. The quality of the early plates was very poor, showing lack of facilities for manufacture and experience in producing pure and homogeneous metal and in working it. This condition of affairs was speedily altered; heavy hammers and rolls were rapidly brought into use, and by 1862 the manufacture of homogeneous wrought-plate was brought to the highest state of perfection, both in England and France. In the meantime gun and projectile makers had not been idle. The 32-pounder and 68-pounder smoothbores using solid cast-iron projectiles were the standards for armor testing; the 8-inch, 9-inch, and 10-inch shell guns were brought out long before the application of armor to sea-going ships, but shells from these guns were too light, and the shot of too low velocity, to render them superior to the longer pieces mentioned.

Rifled guns began to be used commonly about 1860; France, Prussia, and Russia adopted them in 1858, the two latter deciding upon the breech-loader. France retained the muzzle-loading system until 1864; the *Gloire* was armed with a battery of muzzle-loading rifles in 1859, though her designed armament consisted of smoothbores. In 1855 Armstrong brought out a breech-loading piece of small calibre, and Whitworth submitted to the Government in 1856 designs for breech-loading and muzzle-loading guns of all calibres. The Armstrong system was adopted for use in the British Navy, but repeated accidents led to an outcry against the breech-loading system, and in 1863 the Committee on Designs for Artillery conducted experiments with muzzle-loading guns which led to the adoption of the Woolwich type of muzzle-loader. But whether breech-loading or muzzle-loading, the guns were all *rifles*, and the increased penetrative power rendered all armor so far produced easily vulnerable. The armor makers endeavored to meet the new situation in various ways. The thickness of the plate was increased; steel plates of various kinds were tried, as were plates made up of layers of steel and iron. The steel plates resisted perforation better than wrought iron, but were so easily cracked and destroyed that they failed to gain favor. Whitworth, always in the van in the development of ordnance, made and used forged steel projectiles in 1862, but their value was not generally realized, because the soft iron armor then in vogue was equally penetrable by the cast-iron shot. As the thickness of the wrought-iron plate increased, the difficulties of its manufacture grew rapidly. Neither rolls nor hammer could successfully handle the thickness demanded by ship designers. Resort was had to welding, but this was not satisfactory; first, because it could not be effectively done except by machining the faces to be joined, which added greatly to the expense; and secondly, because even then the weld was usually imperfect. The next step was to 'sandwich' several plates with a layer of wood between them. The result was found to be inferior to that obtained from a single plate, but the plan was for a time accepted as the best available one. In 1866, Gruson in Germany and Palliser in England brought out cast-iron shell with hard, chilled points. These further increased the penetrative power of the gun.

The question of the backing of armor received attention from time to time, and the results obtained are interesting even now. With the low velocities in use up to 1880, wood-backing played a very important part, but its importance has diminished in recent years; all thick armor is still backed with wood, but its thickness is about a quarter of that considered desirable in the days of wrought-iron plate. The backing of the *Warrior's* 4.5-inch armor was of teak, 20 inches thick, in two layers of 10 inches each. A less thickness of backing and 5 inches of armor gave inferior resistance to penetration. As projectiles improved in quality and acquired greater velocity, the advantage of thick backing was less apparent; indeed, except for the purpose of reducing the shock to a ship's framing it is now regarded as disadvantageous, for the same weight added to the plate to increase its thickness will give greater resistance to penetration.

Notwithstanding the confessed weakness of homogeneous wrought-iron plate, a successful competitor was long in coming, though both compound and steel plates early appeared in the competition, as has already been stated. In 1859 the Mersey Works in England submitted 2.5-inch plates made up of three layers, the outer ones of wrought iron welded to a middle one of steel; the welding was imperfect and the brittleness of the steel affected the outer layers; moreover, they were constructed on a wrong principle, as will be seen presently in connection with capped projectiles. In 1861 compound and steel plates were tested in England; while a long series of tests with steel was carried on in France from 1857 to 1861. The theoretical advantages of steel and compound armor were thoroughly understood at this time, but brittleness defeated one and imperfect welding combined with brittleness precluded the use of the other. The preëminence of wrought-iron plate continued practically undisputed until 1876. In 1875, the Italian Government called for test plates of 22-inch solid armor from all the principal manufacturers in the world. Four responded—Brown & Co. submitted two solid iron plates; Cammell & Co. one solid plate and one sandwich target; Marrell et Cie. presented the same: and Schneider et Cie. presented for test two solid steel plates. The trials took place at Spezia in 1876, and the result was overwhelmingly in favor of the steel plates; though these cracked more than the others, the difference in resistance to penetration was great. As a result of the Spezia test, wrought-iron plates were fully discredited. In England, where the prejudice against steel was fostered to some extent by national jealousy of a French manufacturer's success, compound armor was rapidly developed. This consisted of a hard steel face welded to a wrought-iron back.

In the Wilson process (Cammell & Co.), molten steel is poured on a white-hot iron plate, thus adding one-third to the thickness of the plate, which is afterwards rolled. In the Ellis process (Brown & Co.) a wrought-iron and a rather thin, hard steel plate are separately made. The lower plate is placed in the furnace; iron bars are placed around the edge forming a berm, and the steel plate laid on the bars. After they are raised to a welding heat, molten steel is poured into the space between the plates, welding all together. There are other systems of compound plate manufacture, but these have attained the greatest eminence, if extent of use is a criterion, and they exemplify the type. The first really successful compound plates appeared in 1877, and from that date they competed with steel plates on apparently equal terms until 1889, when Schneider brought out his first nickel-steel plate. The trial of this plate took place in July, but it was not until the next year that attention was fully drawn to the importance of the new metal. The United States naval authorities, having purchased in Europe a compound plate from Cammell & Co., a steel plate and also one of nickel steel from Schneider et Cie., held a competitive test at the naval proving-ground, Annapolis, in September, 1890. The compound plate was ignominiously defeated, both by the steel plate and by that of nickel steel. Indeed, the defeat was so complete and convincing that it stopped the manufacture of compound plates at once. The Navy Department had already committed itself to the manufacture of steel armor, and large contracts for it had been given out some years before. The wisdom of the decision in favor of steel had been questioned in Congress and in the public press, and the trial was instituted to convince the doubters; the occasion also served to effect a trial of a nickel-steel plate which had been acquired on account of the promising results obtained by Messrs. Schneider et Cie the year before. The important results of this trial had hardly appeared when a second trial of like revolutionary character took place. A year or two before, Mr. Harvey, a manufacturer of fine-grade tool steel, was at the Washington gun factory. In a conversation with him, Captain Folger, the superintendent of the naval gun factory, suggested the attempt to adapt the Harvey system of hardening tool steel to armor plate. After considering the matter, Mr. Harvey decided to make some experiments looking to surface hardening armor; and the result was the Harvey process of surface carburization and hardening. In this process the plate is placed on the floor of a suitable furnace in a bed of refractory material, leaving the surface to be hardened uppermost. This is covered with carbonaceous material, which is rammed down upon it; over the carbon is put a layer of sand covered in with fire-brick. The temperature of the furnace is then raised to about the temperature of melting cast iron and kept so for several days, until the required additional carburization—usually about 1 per cent.—is effected. The plate is then removed, and, when cooled to a dull cherry red, is hardened by a water jet or immersion in running water. The trial of the first plate made by the Harvey process took place February 14, 1891, and was very successful. The popularity of the new armor was immediate, and the cause is not far to seek, for in its construction it embodied the combined views of armor theorists.

Supporters of compound armor accepted the defeat of the year before with reservations. They still adhered to the idea of a hard face and soft back; and they were right in so doing. The advocates of a single, practically homogeneous plate were also satisfied; they held, very properly, that the strength of iron armor plate must not lie solely in defeating the projectile by breaking it up, but in keeping it out by the toughness of the plate. A third class of critics—more or less in sympathy with the compound armor people, but not completely so, and declaring that no armor is fit to put on a ship which breaks up under attack and leaves the side bare afterwards, even if it stops that particular projectile, —were also satisfied. In England, the Harvey system was adopted almost at once, but notions of misplaced economy and the difficulty of working the resulting metal caused the rejection of nickel in steel. But this view was held only a few years. The next improvement, in 1895, was effected by the Carnegie Company, which found that a reforging of plates after carburizing considerably improved the quality. Soon after the appearance of Harveyized armor, Krupp, Schneider, the Terni Works, and several other European makers began experiments along the same lines. The ones mentioned alone produced any noteworthy results, and it is to be remarked that all three adopted the method of carburization by means of gas rich in carbon. Of these three kinds, the product of Krupp is generally regarded as the best. Krupp armor differs from that previously made, not only in the process of manufacture, but in its chemical constitution. Its exact character is a jealously guarded trade secret, which has been sold at a high price to nearly all the great armor manufacturers of the world, but that it contains a small amount of chromium as well as carbon is now generally understood. Previous attempts to produce chrome steel armor had not been successful, though the trials had been numerous and persistent. Nearly all of the armor now applied to ships, except very thin plates, is made by the Krupp process. The Terni Works in Italy, and Schneider in France, have continued the development of their own processes, which give nearly equal results.

The object of having a hard face to armor is to break up projectiles by shock, or so to strain or deform them as to reduce their penetration. It is particularly effective on oblique impact (i.e. where the projectile strikes at an angle with the plate). To combine hardness with toughness was the aim of armor makers for a quarter of a century, and success was not obtained until the advent of nickel steel. Had not the improvement of projectiles and guns kept pace with the development of armor, ships could now be made invulnerable; but both have improved so that the relation of guns and armor is now less favorable to the latter than at almost any time in its history. Nevertheless, armor is absolutely indispensable to the protection of ships and their crews against all classes of gunfire. The power of good Harvey nickel-steel armor to resist penetration is about equal to that of double the thickness of wrought iron, and the resisting power of Krupp armor is 10 to 15 per cent. greater. These figures are for attack by ordinary armor-piercing projectiles. Projectiles of this type which are fitted with soft caps (see PROJECTILES) penetrate about as deeply in Krupp as in Harvey armor, and the gain by the use of caps is equal to a reduction in thickness of 8 to 10 per cent. in Harvey armor and 15 to 20 in Krupp—that is to say, a capped projectile will perforate a Harvey plate 8 to 10 per cent. thicker, or a Krupp plate 15 to 20 per cent. thicker, than will a projectile not provided with a cap. The penetration in armor of the latest United States guns is seen in the accompanying table:

Calibre of gun.	Weight of projectile, lbs.	Muzzle velocity, f. s.	Muzzle energy, ft. tons.	Perforation at muzzle.			
				Harvey nickel steel.		Krupp armor.	
				Capped Projectiles.	Uncapped Projectiles.	Capped Projectiles.	Uncapped Projectiles.
3-inch, Mark I.	13	2800	709	4.4	3.6	4.4	3.6
4-inch, Mark VII.	32	2900	1870	6.7	5.7	6.4	5.6
5-inch, Mark V.	60	2900	3503	8.6	7.5	8.4	6.6
6-inch, Mark VI.	100	2900	5838	10.9	9.3	10.9	7.3
7-inch, Mark I.	165	2900	9646	13.2	11.8	13.2	10.5
8-inch, Mark V.	250	2800	13602	15.0	13.6	15.	12.1
10-inch, Mark III.	500	2800	27204	20.	18.6	20.	17.1
12-Inch, Mark III.	850	2800	46246	25.	23.4	25.	21.7

The principal armor makers in the United States are the Carnegie Works at Pittsburg and the Bethlehem Steel Company of South Bethlehem. Other companies have furnished thin plates.

Another form of armor, not used for ships, but only for fortifications, is made of chilled cast iron, and was developed by Gruson, whose works were located at Magdeburg-Buckau. Herr Gruson died in 1895, and his establishment was then purchased by Krupp. The metal was a specially excellent low carbon cast iron, chilled in the casting on its outer surface, without apparently weakening its tenacity. It is designed and shaped to be used in cupolas of special dome-like form covering one or more guns. Where weight is of no importance it is a very effective defense. Works for its manufacture in the United States have been established near Philadelphia.

A full account of the early development of armor by Lieut. E. W. Very, U. S. N., is found in the *United States Naval Institute*, vol. ix., No. 3 (1883). Numerous other papers of less length, but of much value, appear in later numbers of the *Proceedings*. For additional information, see *Armor and Its Attack by Artillery*, London, 1887, by C. Orde Brown; also, the *Annual of the Office of Naval Intelligence*, U. S. Navy, especially for the years 1891 and 1892; and *Text-Book on Ordnance and Gunnery for Use at the Naval Academy*, by Commander R. R. Ingersoll, U. S. N.

For further information in regard to armor, see BALLISTICS (under Ballistics of Penetration); SHIPS, ARMORED; also PROJECTILES and GUNS, NAVAL.

AR'MORY (from *armor*, ultimately from Lat. *arma*, arms). A military depot or building set apart for the use of troops, storage of arms and equipment, or purposes of defense. In the United States the term armory is generally applied to local headquarters for parts of the national guard or militia, which are used for purposes of drill, organization, regimental or departmental offices, and the storage of all stores and equipment pertaining to the troops occupying them. In many instances they are magnificent examples of military architecture, from both the interior and exterior points of view. Equipped with every modern convenience and many luxuries, they afford many of the characteristics and advantages of a first-class gymnasium or social club. Such features, however, are secured generally by the officers and men themselves, and contribute largely to the success and good standing of the corps in its particular community. In case of local disturbances, the buildings are admirably adapted for defense, or use as a basis of operations. In England and Continental Europe, the name armory is sometimes applied to a museum of military antiquities, as the armory at Warwick Castle, England, or at the Tower of London, which, however, contains a store of modern as well as ancient and mediæval arms and armor; it also, and more generally, applies to that part of an arsenal, barracks, camp, cantonment, or fort where are situated the offices and workshops of the armorer and his assistants, or are stored supplies of arms and accoutrements. Examples of the latter may be found in every European military post or station.

AR'MOUR, Herman Ossian (1837—). An American merchant. He was born at Stockbridge, N. Y., was in business at Milwaukee, Wis., from 1855 to 1862, and as a grain commission merchant at Chicago from 1862 to 1865. He became the New York representative of the Milwaukee packing firm of Armour, Plankinton & Co. in 1865. The firm name of H. O. Armour & Co. was retained at Chicago until 1870, when it was altered to Armour & Co., now controlling the largest provision industry in the world.

ARMOUR, Philip Danforth (1832-1901). An eminent American merchant and philanthropist. He was born in Stockbridge, N. Y., and was educated in the public schools there. In 1852 he made the arduous overland journey to California, but returned four years later and established himself in the grain and warehouse business in Milwaukee. Here, in 1863, he became the head of the firm of Armour, Plankinton & Co., pork packers, whose main office was transferred to Chicago in 1870, where a reorganization was soon afterwards effected under the name Armour & Co. The business increased with great rapidity, and at the time of Armour's death the firm owned more grain elevators than any other house in the world, had more than 50,000 employees on its payroll, and sent exports to every civilized country. Armour was noted no less for his philanthropy than for his business acumen and executive ability, and, in addition to lesser benefactions, endowed the Armour Institute of Technology (q.v.) and the Armour Mission, in Chicago, the combined endowments of which amounted to $2,500,000.

ARMOUR IN'STITUTE OF TECHNOL'OGY. An American institution for the advancement of technical and practical education. It was founded at Chicago in 1892 by Philip D. Armour for the purpose of giving young men and women an opportunity to secure at moderate expense a broad and thorough knowledge of applied science. The plan of organization embraces (1) *The Technical College*, offering four-year courses in mechanical, electrical, civil, and chemical engineering, and a two-year course in architecture; (2) *The Department of Commercial Tests*, giving facilities for testing construction material, for the calibration of pressure gauges and electrical instruments, and for special tests and investigations; (3) *The Armour Scientific Academy*, a preparatory school fitting boys for admission to the engineering courses of technical colleges. The four-year courses in mechanical and electrical engineering were first established and later the course of architecture was included by union with the *Art Institute of Chicago*. The course in civil engineering was established in 1899, and that in chemical engineering in 1901. In 1901 the college faculty numbered 38, and the students 666. At the same time the total value of the property under the control of the institute was $4,560,000. President, Frank Wakeley Gunsaulus, D.D.

ARMS, Armorial Bearings, or Ensigns. Names given to such devices as when painted on a shield form a coat. These terms in popular speech include all the accompaniments of a shield —viz., the crest, helmet, and, where such exist, the supporters, etc. See Heraldry.

ARMS, Assumptive. See Heraldry.

ARMS, Sergeant at. See Sergeant at Arms.

ARMS, Stand of. A general title for one or more rifles or other military weapons. It is generally used to describe a complete set of arms for one soldier, including rifle, bayonet, and cartridge-box and belt.

ARM'STEAD, Henry Hugh, R.A. (1828—). An English sculptor. Among his numerous works are many of the allegorical groups on the Albert Memorial, London; carved panels in the New Palace, Westminster, illustrating the history of King Arthur and Sir Galahad; and many effigies, including those of Bishop Wilberforce at Winchester and Lord Thynne at Westminster Abbey.

ARM'STRONG, David Maitland (1837—). An American decorative artist and genre painter, born at Newburg, N. Y. He graduated in 1858 at Trinity College, studied art at Paris and Rome, and was for four years consul-general for Italy. At the Paris Exposition of 1878 he was director of the American art department. He is a member of the Society of American Artists, and has his studio in New York.

ARMSTRONG, George Francis Savage- (1845—). A British writer, known in Ireland as 'The Poet of Wicklow.' He was born in Dublin, was educated there, and in 1871, became professor of English literature in Queen's College, Cork, and in Queen's University. Among his numerous published works are: *Poems* (1869); *A Tragedy of Israel*, a trilogy (1872-76), and *Stories from Wicklow* (1886). A complete edition of his poems in ten volumes was published in 1892. In 1891 he prefixed the name of his maternal grandfather, Savage, to his surname.

ARMSTRONG, George Frederick (1842—). An English engineer. He was educated at King's College, London, and at Cambridge. Developing a strong taste for mechanics, he studied engineering, and was professor of engineering in the School of Applied Science at McGill University in Montreal during 1871-76. He was then called to a similar chair in the Yorkshire College of Science, Leeds, and in 1885 became Regius professor of engineering in the University of Edinburgh. He is a member of many learned societies, and the author of numerous papers and addresses.

ARMSTRONG, John (1709-79). A Scottish poet, born in the parish at Castleton, Roxburghshire. He took the degree of M.D. at Edinburgh University in 1732; in 1746 was appointed physician to the London Hospital for Lame, Maimed, and Sick Soldiers, and in 1760 physician in the German Army. He gained a wide popularity by a didactic poem called the *Art of Preserving Health* (1744), containing some of the very best blank verse written in the Eighteenth Century; and was also a master of terse prose. Particularly brilliant is *Sketches or Essays on Various Subjects*, published under the pseudonym of Launcelot Temple (1758). He was a friend of many wits and authors of his day, among them Thomson, who is believed to refer to him in canto 1, stanza lx. of the *Castle of Indolence;* and Wilkes, who probably obtained for him the post in the army. Consult Ward, *English Poets*, vol. iii.

ARMSTRONG, John (1725-95). An American soldier, born in the north of Ireland. He led a successful expedition in 1756 against the Indians at Kittanning, Pa. He became a brigadier-general in the Continental Army in March, 1776, but resigned in April, 1777, to take the same rank in the Pennsylvania militia, which he commanded at Brandywine (September 11) and at Germantown (October 4), becoming a major-general in January, 1778. He served twice in the Continental Congress (1778-80 and 1787-88). He died at Carlisle, Pa.

ARMSTRONG, John (1758-1843). An American soldier and diplomat, son of John Armstrong, the soldier (1725-95). While a student at Princeton he enlisted in the army and was soon made aide-de-camp to General Mercer, with the rank of major, and subsequently general. He wrote and published anonymously the famous *Newburgh Addresses* in 1783, and in 1784 conducted a campaign against the Connecticut settlers in the Wyoming Valley. (See Wyoming Valley.) At the close of the war he served as secretary of state and attorney-general of Pennsylvania, and in 1787 was elected a member of Congress from that State. In 1789 he married the sister of Chancellor Livingston, of New York, and, removing to that State, was in 1800 elected United States Senator, and served in the Senate until 1804. From then until 1810 he was minister to France, being also minister to Spain (1806-10). He was appointed brigadier-general in July, 1812. In January, 1813, he was made secretary of war, but in consequence of the failure of the Canada expedition and the capture of Washington he became very unpopular, and resigned in September, 1814. He published *Notices of the War of 1812* (1836); memoirs of Generals Montgomery and Wayne in Sparks's *American Biographies*; and partially prepared a history of the American Revolution.

ARMSTRONG, John (1784-1829). An English physician and medical writer. He was born at Ayres Quay, near Bishop-Wearmouth. He studied medicine at the University of Edinburgh, and in 1811 was chosen physician to the infirmary at Sunderland. In 1816 he published a work on *Typhus*, which greatly increased his reputation. Two years later he removed to London, where his practice became extensive, and he was elected physician to the Fever Hospital. He was instrumental in establishing two medical schools in London. His lectures were published after his death. Consult *Memoirs of the Life of J. Armstrong*, by F. Boott (London, 1834).

ARMSTRONG, Johnnie. The hero of several old Scottish songs and ballads, among which are "Armstrong's Goodnight," and two others, both called after his name. A border freebooter, who lived with his lawless followers in the early part of the Sixteenth Century, he was finally hanged with 36 of his retainers, by James V. in a forest near Hawick.

ARMSTRONG, Robert (1790-1854). An American soldier, born in Tennessee. In the Creek War of 1813-14 he commanded an artillery company, and was severely wounded at Talladega, January 24, 1814. He commanded the artillery at the battle of New Orleans (January 8, 1815), and was a brigadier-general of volunteers in the second Seminole War (1835-37).

ARMSTRONG, Samuel Chapman (1839-93). An American soldier and educator. He was born in Hawaii, where his father was a missionary of the American Board and minister of public instruction. He began his collegiate course at Oahu College and completed it in 1862 at Williams. He was for a short time chief clerk of the Department of Public Instruction in Hawaii and editor of *Hae Hawaii*. He then entered the Union Army, and in 1863-65 was colonel of the Eighth United States colored regiment. At the close of the war he was brevetted brigadier-general of volunteers. He was superintendent of a district of ten counties in Virginia in the Freedmen's Bureau, 1866-68. In the latter year he founded and became principal of the Hampton Normal and Agricultural Institute (q.v.). His constant endeavor was to show the best methods of educating the negro and Indian races in this country, adopting to that end a system of combined labor and study, to give them the means of self-support, develop manual skill, and promote manliness and self-reliance. His work for the neglected races produced most beneficial results.

ARMSTRONG, William George, Baron (1810-1900). An English engineer, scientist, and inventor of hydraulic machinery and ordnance. He was born at Newcastle-upon-Tyne, and received his early education at Whickham and Bishop Auckland. Yielding to his father's wishes, he determined to follow the profession of law and spent several years in a solicitor's office, but was diverted from this calling by a taste for scientific research and mechanics. His first important discovery was the hydro-electric machine, which consisted of an insulated boiler from which steam at high pressure, escaping through nozzles of peculiar design, produced frictional electricity. In recognition of this discovery, Armstrong was made a fellow of the Royal Society in 1846. Soon afterwards he invented the hydraulic crane, and for the construction of hydraulic machinery he founded the Elswick Engine Works, in the suburbs of his native town. In 1854, at these works, were made the rifled cannon with which his name is associated as inventor. So successful was he in his construction of ordnance that he was appointed engineer of rifled ordnance at Woolwich, and was knighted in 1859. Some 3500 cannon were constructed under Sir William Armstrong's direction between 1859 and 1863, when he resigned his official position to resume his active connection with the Elswick Works. In 1863 he was president of the British Association, and delivered an address in which he called attention to the decrease in the coal supply of Great Britain and the exhaustion of the deposits. In 1882 he was president of the Institution of Civil Engineers and served in a similar capacity for several terms in the Institute of Mechanical Engineers. A member of the Iron and Steel Institute of Great Britain, he received from that organization the Bessemer Medal in 1891, and was honored with the degree of LL.D. from Cambridge in 1862, and that of D.C.L. from Oxford in 1870. In 1887 he was raised to the peerage. The Elswick Works, which at first were concerned with the construction of hydraulic cranes, engines, accumulators, and bridges, were greatly expanded and became celebrated for the production of ships of war as well as ordnance and machinery. Lord Armstrong played an important part in the development of the breech-loading cannon and armor plate, and his improvements will be found discussed in the articles ORDNANCE and ARMOR PLATE.

AR'MY. See ARMIES and ARMY ORGANIZATION.

ARMY ADMIN'ISTRA'TION. See ARMY ORGANIZATION.

ARMY CORPS, kōr. See ARMY ORGANIZATION.

ARMY ESTIMATES. UNITED STATES ARMY. The estimates furnished annually by the heads of the various branches of the War Department, giving a statement of their requirements, and the amount of money necessary for the same. The estimates are addressed to the secretary of war, who, in his report to the President, submits the same, together with his comments thereon. The President, in his turn, sends the estimates to Congress, upon which the House of Representatives draws up the Army Appropriation Bill, which is then sent to the Senate for final action. The appropriations are expended by the heads of departments, under the general direction of the Secretary of War, after which the final accounts are audited by the auditor for the War Department of the Treasury. The same general procedure obtains in all other civilized countries, varying only in details due to the various governmental constitutions.

ARMY OR'GANIZA'TION. The power of an army rests on two elements: Its *material* strength and its *moral* strength; the former depending on the character of its commanders and soldiers and its organization, the latter being determined by its discipline, the system of military education, and the national spirit. *Organization*, in a military sense, comprises, in general, all the measures taken to insure to the army a regular and normal working of all its parts, to provide it with all the necessary machinery, to obtain for it regularly all that it requires, to insure its proper instruction, to protect the rights and prescribe the duties of each individual by suitable regulations, to supply the personnel and material which it needs, and, finally, to provide all the means whereby nothing may be wanting to enable it to fight under the most favorable conditions. In a limited sense the word *organization* is also used to designate the composition or formation of any body of troops; but this is only a particular application of the general meaning of the word.

The entire theory of organization rests upon the principle of individual responsibility and subordination, so that, no matter how small or how great the number of individuals gathered together, some *one* is responsible, to whom the others must be subordinate. This responsibility and subordination are the great factors in the control of an army, and tactical organization may be defined as the arrangement of an army in such wise as to enable it, in whole or part, to respond at all times to the will of the commander, promptly and efficiently. One of the first elements of strength in an army is the skillful organization of its *command*, and in this all nations are agreed as to the necessity for *unity*—that is, for a *commander-in-chief* of the forces. Next in importance are the assistants to the commander-in-chief, viz. the staff and the entire corps of officers. Finally, arises the question of the number of men to be assembled under one leader, into bodies of various strength, their most advantageous subdivision, and the proportion of accessories of all kinds to be joined to the combatant forces. The army, then, is made up of a collection of units, differing according to the purpose of the organization. Thus, *tactical* units are the basis of organization for the tactical handling of troops in the field, while *administrative* units are the basis for administration and supply. A *tactical unit* is the largest body of men which can be directly commanded by the voice of a single commander. An *administrative unit* is the smallest organized subdivision having a complete administration of its own.

INFANTRY. The tactical unit of infantry in the great armies of the world is the battalion, composed of about 1000 men, and divided into four companies of about 250 men each. In the United States Army the battalion is of very variable strength in time of war, but is usually considerably smaller than the European battalion. The company, in this service, is divided into two platoons, and each platoon into two sections, each section is composed of two or three squads, each squad comprising a corporal and seven privates. In the great European armies there are slight differences, but in the main the subdivision is similar. In Germany, however, the company has three platoons, each divided into half-platoons, and these again into sections; while France has four platoons, subdivided into sections and squads. The administrative unit of infantry is the regiment of three battalions, normally, sometimes four. A brigade is composed of two regiments in Europe, of three in the United States. It is the largest unit composed exclusively of infantry.

MOUNTED INFANTRY. Great Britain is the only nation that has organized and developed mounted infantry, an arm which proved so effective on both sides in the Boer War (1899-1902) that it will probably form a part of all future war armies. This body of troops does not exist in an organized form in England in time of peace, but a certain number of men, selected and detailed from the forces, are trained for this service. In time of war each battalion receives one of the four sections of a company, and a cavalry division receives a battalion of 8 companies. Each company is composed of 5 officers and 123 men; each battalion of 48 officers and 1094 men.

MACHINE-GUN BATTERIES. Several nations have organized machine-gun batteries, not as artillery, but as a special kind of infantry or cavalry. In Great Britain, each infantry and cavalry brigade receives, in time of war, a section composed of 2 Maxim guns. In Switzerland each brigade of cavalry has a machine-gun company with 8 Maxims attached to it, which practically gives it the fire power of two companies of infantry, and at the same time an escort of great mobility.

CAVALRY. The tactical unit of cavalry is the squadron of 150 sabres. In the United States service the squadron is composed of 4 troops, each of 100, war strength. The administrative unit is the regiment, composed of 4 field squadrons and 1 depot squadron in Germany; of 3 squadrons in the United States. The brigade, in Europe, consists normally of 2 regiments; in the United States service, of 3.

Artillery. The tactical unit of field-artillery is the battery, composed in the United States of 6 guns, 9 caissons, 1 forge and battery-wagon, 1 store-wagon. The field-battery has 175 men and 150 horses, the horse-battery 165 men and 235 horses. The tendency in Europe is to reduce the battery to 4 guns, and with the adoption of a rapid-fire field piece (now undergoing trial) this will probably be the strength of the future field battery in the United States Army. A battalion (*Abtheilung*, group, brigade, division), composed of from 2 to 4 batteries, now constitutes an important organization on the battle-field. The tactical unit of coast artillery is also the battery, composed in this case, however, of a variable number of guns, usually from 1 to 4. The administrative unit of artillery in the principal armies of the world is the regiment, composed of from 2 to 5 battalions. It is the largest purely artillery organization. In the United States, since the recent reorganization of the artillery into a *corps* (see Artillery Corps), without regiments, the battalion is the administrative unit of the field-artillery, the district (the entire defense of harbor or post) of the coast artillery.

Mountain Artillery. The nations possessing mountainous regions generally have batteries of mountain artillery differing in organization and tactical use from the ordinary field-batteries. Thus, the Alpine batteries of France have a strength of 5 officers, 156 men, with 96 animals; those of Italy, of 6 officers, 280 men, with 148 animals and 18 wagons; those of Switzerland of 7 officers, 162 men, and 83 animals.

Combined Arms. If we define the *strategical unit* as the smallest body composed permanently of two or more arms, and capable of acting independently, then the *division* of the European armies (the *army corps* of the United States Army) must be regarded as that unit. The smallest unit in which any two of the arms are combined is the cavalry brigade, which often has a horse-artillery battery attached to it, but this is only done to make it temporarily independent, and is not the rule. Ordinarily the brigade (cavalry or infantry) is the largest unmixed unit. The cavalry division is composed essentially of 2 brigades and 2 or 3 horse-batteries, although in the United States it has 3 brigades and a battalion of horse-artillery. The infantry division (the smallest unit in which the three arms are combined) consists in general of 2 infantry brigades, 1 cavalry regiment, 1 field-artillery regiment, and other special troops differing in the different countries. In France, however, there is no cavalry attached to the infantry division, and in the United States there are 3 brigades, 4 batteries, and no cavalry.

The highest definite unit of organization is the army corps, and its strength is determined by the fact that in its most unfavorable formation it must be capable of being assembled or any portion of itself in a single day. It is composed normally of 2 infantry divisions, 1 regiment of field-artillery, train and other services. In France, as there is no cavalry with the infantry divisions, a brigade of cavalry is attached to the army corps, and in the United States this unit is composed of three divisions, one or more regiments of cavalry, and the corps artillery. Since the artillery reserve was given up by Germany in 1899 the principal nations have followed this example, although a few still retain it. The total strength of an army corps is about 30,000 in all armies, forming a column about 15 miles long, its rear, therefore, one day's march from its head. Armies are simply aggregations of army corps and cavalry divisions, the artillery reserve being practically a thing of the past. The proportion of the three arms of the line is now considered to be best when the infantry and cavalry are in the ratio of 12 to 1, and there are 4 guns to every 1000 men of the other arms. The proportion of cavalry has been gradually made smaller since the days of Frederick, while that of the artillery has been gradually increased. In difficult mountainous country the cavalry is usually made less, but not if it can be used in raids at a distance. The proportion of artillery in flat, heavily wooded country, or in difficult mountainous country, or in country where the roads are bad, is usually decreased, because the full proportion cannot be used advantageously, and a smaller proportion would diminish the length of the column, which is always desirable.

Thus far only the line of the army, in its most restricted sense, has been considered, but the efficient working of an army also requires a number of special troops, such as the engineers, pioneers, railroad engineers, pontoniers, sappers and miners, signalers, telegraphers, balloonists, and the medical corps. In foreign armies all the special troops, excepting the medical corps, are designated by the general term *technical troops*. Of course, these do not all exist in any one army, and, although the corresponding classes in the different armies have similar duties, there is still considerable difference.

Engineers. The engineer troops of all armies are usually organized like infantry. In the German Army they comprise the pioneers and the railroad engineers the former organized into battalions of four companies each, the latter into regiments of two battalions each, including a balloon section. The latter is composed of six officers and about 150 men. The pioneers are charged with the construction of field fortifications and intrenched camps, bridge-building, the construction and destruction of communications and obstacles, and siege operations. The bridge train of a division has material for a bridge 38 yards long, and that of a corps 135 yards long, hence the entire bridge material of a corps and its divisions is sufficient for a bridge 211 yards long. The railroad engineers have charge of the construction of the narrow-gauge field railroad; each company can construct in one day about 7 miles of railroad complete, the track in working order ready for locomotives and cars. In the French army the engineer troops are organized into regiments, one of which is composed entirely of railroad engineers, the others being designated as sappers and miners; there is also a corps of telegraphers under the engineers. In the United States the engineers are organized into battalions of four companies each.

Signalers. The Signal Corps of the United States Army has charge of the field-telegraph, the military balloons, wireless telegraphy, and ordinary signaling by flag, torch, or heliograph (see Signaling and Telegraphing, Military). In the field an army corps will have attached to it one company of about 175 men, with material for at least 50 miles of telegraph-line. Military telegraphers are organized in a different way in almost every existing army. In the United States and Great Britain, the Signal Corps will, in time of war, be augmented by telegraphers from civil life. In Germany one of the companies of a pioneer battalion is a telegraph company, while France has a field-telegraph battalion, as the fortification telegraph is in the hands of the engineers: Russia and Italy have a field-telegraph company for each army corps, and Austria-Hungary has a field formation of about 50 officers and 2000 men for this service.

Military Balloonists are also variously organized in the different armies, but most of the more important nations either already possess or are organizing balloon sections, which are either under the engineers or under the telegraphers, though in a few cases they are independent units. Germany has a balloon section, one company in strength, attached to the railroad engineer brigade; France has one company of balloonists attached to each of the engineer regiments, and in time of war these will be augmented to 8 field sections, 4 fortification sections, and one depot section; and several other nations have balloon companies and parks—namely, Denmark, Great Britain, Italy, Russia, and Switzerland.

Military Cyclists are formed into detachments and are used by all the great nations for orderly service, outpost, and reconnaissance duty and in fortifications for messenger duty. The troops are generally taken from the ranks, and have as yet no definite organization, although many forms have been tested in the autumn manœuvres. In France, the 2 companies organized in 1899 consisted each of 5 officers, 9 sergeants, 8 corporals, 2 trumpeters, 4 mechanics, and 100 privates.

Carrier Pigeons have also been used on a large scale, especially in Italy and France, not only in permanent stations, but also with cavalry on the march.

Medical Department. In the principal European armies every battalion has its own medical officer, and most of them have *attendants* as a permanent part of the regimental cadre, in addition to the company bearers. In Germany a *hospital corps detachment*, for discovering and removing the wounded on the battlefield, establishing *dressing stations* and giving *first aid*, comprises 7 surgeons, 1 apothecary, 8 hospital stewards, 8 attendants, 191 bearers, and 12 ambulance wagons. A *field hospital*, for about 200 patients, has 5 surgeons, 1 apothecary, 9 hospital stewards, and 12 attendants with 6 wagons. In the United States the sanitary organization of a corps proper comprises one medical director and a reserve of hospital corps men and material for about 2000 patients; a division has a bearer company, an ambulance company, and a field hospital for 500 patients; to each division, brigade, battalion, squadron, and battery is assigned a medical officer and a certain number of non-commissioned officers and privates of the Hospital Corps. In the field, the bearer company establishes a dressing station, and hunts up and carries the wounded to it, while the ambulance company conveys the wounded, after the first bandaging and attendance, to the field hospitals. General hospitals (not, as a rule, under the general commanding in the field) are established farther to the rear.

Police. The police of an army in the field usually receives a military organization. In most armies the police is a separate body of troops, but in the United States, troops are detailed from the army to act as provost guard—for a division about one company, and for an army corps about one battalion. In Germany the *Landgendarmerie* is organized into brigades. In France the *gendarmerie* is an integral part of the army, and is organized into *legions* (one to each army corps), commanded by a field officer, and subdivided into companies (one to each department), commanded by a captain, and these into circuits, commanded by a lieutenant.

Train. The term *train* is applied not only to the wagons of an army, but also to the troops who drive them. In all countries except the United States these troops are specially organized and trained for the purpose, but in the United States Army the train (except the ammunition column) has always been under the quartermaster's department, and the men have been detailed from the nearest organizations. In France the train is composed of train squadrons (one to each army corps), composed each of 3 companies, with a strength per squadron, in time of war, of 2300 men and 3500 horses. In Germany it comprises troops organized into battalions (one for each army corps), composed each of 3 companies, the battalion having a strength, in time of peace, of 14 officers, 70 non-commissioned officers, 252 privates, and 190 horses. The *ammunition column*, in the United States, is attached to the corps artillery, and is under an artillery officer; it is divided into four sections (one for each division, and one for the corps artillery). The men of the ammunition column are the reserves for the batteries, and number about two batteries in strength. The *supply train* (carrying five days' rations and forage) is part of the corps train, as is also the baggage train and a horse depot, containing a reserve of 100 horses and 100 mules. The number of wagons required for the train varies much, and in Europe the number allowed for each unit is prescribed. During the Civil War the proportion of wagons in the Army of the Potomac was gradually reduced from 49 to 22 per 1000 men. One of these army corps required about 1086 wagons, while to the German army corps is allowed in all 2150. An important feature of the organization of the army is the Staff (q.v.), which may be either military or administrative. This branch, together with the subjects of Rank and Command, Recruitment, and Discipline, will be found discussed under the appropriate heads; while the actual use and operation of an army and its component parts are treated under Tactics, Military; and Coast Defense. See Artillery; Cavalry; Infantry; and Mounted Infantry for the historical development of these arms in which the changes in organization are discussed. Ancient and modern armies will be found treated under Armies, where the statistics of the leading armies of the world are given. Under each of these articles will be found a bibliography. The works of reference mentioned in the article on Tactics, Military, will be found, in most cases, to deal with the closely related subject of organization. Among these may be mentioned Wagner, *Organization and Tactics* (Kansas City, 1896), and Jerram, *Armies of the World* (London and New York, 1900).

ARMY REG′ISTER, UNITED STATES. The official publication issued each year from the adjutant-general's office, by the secretary of war. It contains a list of the officers of the army, giving the department, regiment, or corps to which they belong, or are assigned; together with information regarding their place of birth, the State from which appointed, whether entered from civil life or the Military Academy, date of entry, and rank held at the time; also the dates of commissions held in the permanent establishment and in the volunteer service, together with the highest brevet rank. It also contains a list of retired officers and aides to general officers; the officers and professors of the Military Academy, and the first five cadets of each class. The lineal rank and the relative rank of officers are given, as well as the officers who have been commissioned for distinguished services, who have received the thanks of Congress, and who have held staff appointments other than under commission, and on whom brevet rank has been conferred. Recipients of medals of honor and certificates of merit are also listed. The casualties during the year are given, as well as military commands and posts, armories, arsenals, and recruiting, engineer, and ordnance depots. There are included statements regarding the organization and pay of the army and militia forces of the United States; the students at universities, colleges, etc., and the honor graduates of the artillery, infantry, and cavalry schools. All foreign nations issue similar lists; in Great Britain it is known as the *Army List*, and is issued quarterly, and in abridged form monthly. This is necessary owing to the constant changes of stations and assignments incidental to the itineration of the army.

ARMY SCHOOLS. Schools for the education of non-commissioned officers and men and their children. In the United States they are known as Post Schools. The most important factor in the making of a thoroughly efficient soldier is a good education. Modern war tactics place more and more responsibility on the individual soldier, and the comparative distance, which the private often is, in action, from those from whom he usually takes his orders, makes it absolutely essential that he be trained in the proper use of every faculty. Non-commissioned officers are the backbone of the modern army, so that what is strongly encouraged in the private is an imperative necessity in their case. In all the armies of to-day, the most exacting and rigid examinations are compulsory for all soldiers desirous of promotion. In the British and most of the Continental armies, the education of the soldier is compulsory up to a certain point, and is strongly encouraged beyond that. The educational test always precedes the military or purely professional examination, without the successful passing of which, the latter is impossible. To such a high degree of efficiency in fact have these nations brought this branch, that it is possible for a soldier to enlist, absolutely illiterate, and at the conclusion of his service, leave with the equivalent of a civil college education. In Germany, opportunities for technical mechanical education are also available. Schoolmasters are a part of their army system and are classified for purposes of pay and promotion. In the United States the post school is the direct concern of the officer commanding the post. Efficient officers are assigned as instructors, and, when necessary, enlisted men possessing the required qualifications are detailed for this purpose, in the proportion of not exceeding one to every fifteen men attending school. If there is a chaplain stationed at the post, he is usually placed in charge. The general supervision of army schools is directed from the headquarters of the respective department commanders, but their official inspection is performed by officers of the inspector-general's department. Post schools for the children of soldiers are also maintained where the number needing such instruction is sufficient, and where schools outside the post are not available; at these schools the attendance for the children of officers is optional, and for the children of non-commissioned officers and men compulsory. Children of citizens living outside the post are allowed to attend, but are expected, if able, to pay a small rate therefor. In the case of enlisted men, the Government supplies all the books necessary.

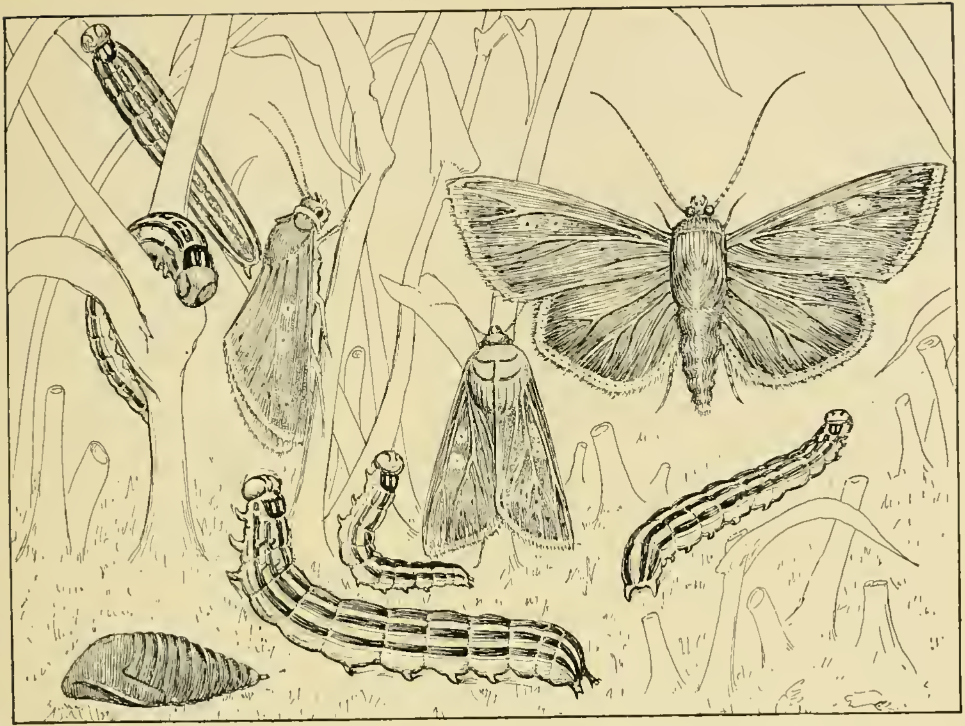
AR′MY-WORM′ (so named from traveling in great numbers). In the northern United States the larva or caterpillar of a dark-gray, yellow-striped moth (*Leucania unipuncta*), a species closely related to the cut-worms. (See plate of ARMY-WORM.) The army-worm is always present in the United States, but only occasionally becomes numerous enough to do much damage. During an early dry spring, it may increase in numbers so that it is obliged to march—that is to say, to go in search of food. It usually feeds on grass, but may destroy fields of grain and Indian corn. The term is frequently applied to other caterpillars of occasional prevalence and harm in fields, especially the so-called 'fall' army-worm (*Laphygma frugiperda*), elsewhere described as GRASS-WORM. Consult *Third Report United States Entomological Commission* (Washington, 1883).

ARNA, är′nȧ (Hind., fem. *arnī*). The Indian buffalo. See BUFFALO.

ARNABOLDI, är′nȧ-bōl′dē, ALESSANDRO (1827-98). An Italian lyric poet. He was born at Milan, and after studying law at Pavia he obtained a municipal appointment at Milan, where he remained for eighteen years, but in 1873 resigned in order to devote himself exclusively to letters. His first volume, *Versi* (1872), attracted immediate attention both at home and abroad, and he found himself hailed as a second Leopardi and Manzoni. Arnaboldi's verse is grave and dignified, and remarkable for the æsthetic quality of the descriptive passages, especially in his long series of poems devoted to Greece and Sicily. Richard Garnett has found in some of his lyrics a resemblance to those of Matthew Arnold; and it has been remarked that he shows the influence of the Germans, particularly Goethe. In addition to his first volume he left *I poeti d'azione* and *Nuovi versi* (1888). Some translations from the *Versi* may be found in E. Lee Hamilton's *Poems and Transcripts* (Edinburgh and London, 1878).

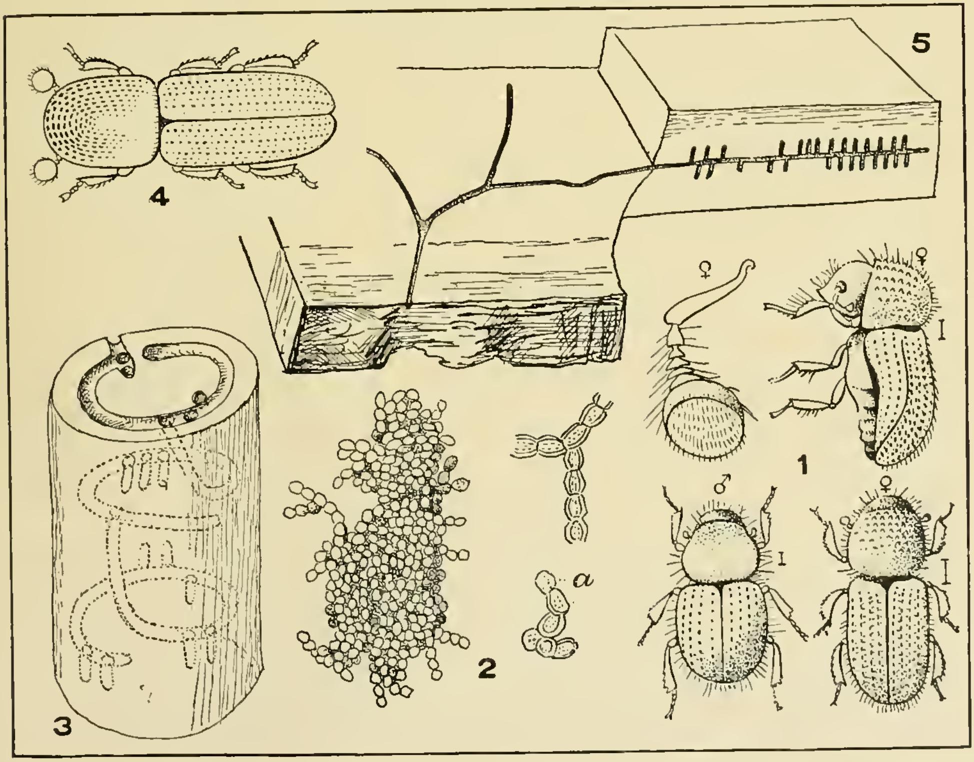
ARNASON, är′nȧ-son, JON (1819-88). An Icelandic writer, born at Reykjavik, Iceland. He is called 'the Grimm of Iceland' because of his collection of *Popular Legends and Tales of Iceland* (1862-64), and other folk-lore of his country, of which he was for many years the national librarian. The collection of popular tales is exhaus-

ARMY WORM



MOTH, LARVA AND PUPA; with caterpillar in various stages of development.

AMBROSIA BEETLES



1. BEETLES (Xyleborus dispar): Male and female, enlarged, and antenna of female more enlarged.
2. AMBROSIA of Corthylus punctatissimus: *a*, detached dumb-bell shaped pairs of cells greatly enlarged.
3. GALLERIES of Corthylus punctatissimus in huckleberry roots; enlarged.
4. GNATHOTRICHUS MATERIARIUS.
5. GALLERIES of Monarthrum mali in maple, showing brood cells (at the right).

tive and faithful to oral tradition. It is one of the most valuable in any literature, and has become a classic handbook to students of comparative folk-lore. Stories from his collection have been translated into Danish, German, English, and French.

ARNAUD, är'nō', FRANÇOIS THOMAS DE BACULARD D' (1718-1805). A French author. While a student at the College of Harcourt he dedicated a play to Voltaire, who thenceforth took a lively interest in his welfare. For two years (1748-50) he was the literary correspondent of Frederick the Great in Paris. He went to Berlin in 1750, and afterwards to Dresden, where he became counselor of legation. On his return to France he published a series of novels and romances entitled *Epreuves de sentiment* (12 vols., 1772-81). These works were very popular in their day, and were highly praised by Rousseau, who declared that "other writers employed their head and their hands, but Arnaud worked from the heart." A complete edition of Arnaud's novels, romances, dramas, and other writings appeared at Paris in 1803.

ARNAUD, HENRI (1641-1721). The historian of the Vaudois, pastor, and soldier. He was a native of Piedmont. Encouraged by the English Revolution and the enthronement of William III., and probably with pecuniary assistance from England, Arnaud undertook to bring back to their native valleys the Vaudois expatriated by Victor Amadeus of Savoy. In September, 1689, he led about a thousand of the exiles into the valley of the San Martino and overcame a superior force; but being in danger of attack by French troops, he retired to the high table-land of the Balsille, making such fortifications as he could. Here he was assaulted, May 2, 1690, by 22,000 French, whose failure was so complete that Arnaud lost not a man, while the French were almost decimated. Arnaud did not risk another fight, but withdrew to Angrogna, and, just when final capture seemed assured, he learned that war had begun between France and Piedmont, and that the Piedmontese king had suddenly become a friend of the exiles, ready to receive them. The Vaudois were at peace in their valleys for a brief space only. In the latter part of the War of the League of Augsburg, from 1689 to 1697, Arnaud and his men did good service against France; but when that was over, the King of Piedmont again leagued with France against them, and 3000 Vaudois were expelled, finding an asylum in Württemberg. Arnaud was invited to England by William III., but preferred to remain pastor among his exiled countrymen at Schönberg, where he wrote his *Histoire de la glorieuse rentrée des Vaudois dans leurs vallées* (1710), dedicated to Queen Anne.

ARNAULD, är'nō', ANGÉLIQUE (DE SAINT JEAN) (1624-84). A daughter of Robert Arnauld d'Andilly, born in Paris, November 24, 1624. She became a nun at Port Royal des Champs in Paris, where she had been educated by her aunt, Marie Jacqueline Angélique Arnauld, sister of the great Arnauld. She was made subprioress (1653), and on removing some years later to Port Royal de Paris she held the same office. During the persecution of the Port Royalists because they were strong Jansenists, Angélique Arnauld, by her piety and courage, sustained the spirit of the sisterhood. They were scattered, and when reunited they were watched by soldiers, lest they should hold communication with persons outside of the convent. In 1669, however, was issued the edict of Clement IX. for the peace of the Church, which was a kind of compromise on this vexed question of Jansenism and Jesuitism. The nuns received back the privileges of which they had been stripped, and constituted their society anew. Angélique Arnauld was again elected prioress. In 1678 she was made abbess. The next year her protectress, the Duchesse de Longueville, died, and the persecution recommenced by the prohibition to receive any more novices. Still Angélique did not despair. She consoled the nuns, and exerted all her influence with persons in power, but with little effect. At last she sank under a complication of griefs, and expired on January 29, 1684, leaving behind her as bright and beautiful a memory as any of her countrywomen. She was learned without being pedantic, pious without bigotry, and gentle to others in proportion as she was severe to herself. Angélique Arnauld wrote several works, the most valuable of which is *Mémoires pour servir à la vie de la Mère Marie Angélique Arnauld de Sainte Madeleine, réformatrice de Port Royal* (Paris, 1742). For her life, consult: Martin (London, 1876); R. Monlaw (Paris, 1901).

ARNAULD, ANTOINE (1560-1619). An eloquent French advocate, born at Paris. His zealous defense of the University of Paris against the Jesuits, in 1594, won for him a wide celebrity and secured their temporary banishment. The Jesuits accused him of being a Huguenot, but the accusation seems to have been unfounded, for he displayed no personal predilection in favor of Protestantism as a distinct religious system. He had twenty children, some of whom formed the nucleus of the Jansenists and Port Royalists.

ARNAULD, ANTOINE (1612-94). A French theologian and polemical writer, known as the great Arnauld. He was born at Paris, February 6, 1612, and was the son of Antoine Arnauld, the celebrated jurist, from whom the younger Antoine seems to have inherited his vigorous intellect and that animosity for the Jesuits which characterized almost his entire life. After a thorough training in the liberal arts, Arnauld began the study of law, but in compliance with his mother's wishes, he abandoned his legal studies for theology. He became a priest in 1641, and in 1643 was made a member of the Society of the Sorbonne. He had previously made a thorough study of the works of Saint Augustine, whose doctrine of sin and grace especially recommended itself to him. In 1643 he published a work entitled *De la fréquente communion*, which at once drew upon him the hostility of the Jesuits and plunged him into a controversy with that Society which lasted for nearly forty years. Arnauld was by nature a controversialist. He was iron-willed, passionate, narrow, erudite, and firmly convinced of his own infallibility. The defense of truth, as he conceived it, was the sole object of life, and in the defense of truth he spared neither himself nor his friends; nor, it must be confessed, truth itself at times. Within the Church he carried on a fierce polemic against the Jesuits; without, he wrote against the Calvinists and Free-thinkers. His indefatigable ardor is illustrated by a characteristic reply made in his old age to his friend Nicole, who urged that after many years of conflict and exile, the aged man should seek some rest: "Rest!" he retorted, "have I not all Eternity to rest in?" The controversy which began with *De la fréquente communion*, in 1643, was continued in the *Théologie morale des Jesuites.* Upon the outbreak of the Jansenist controversy (see JANSENISM), Arnauld took the field against his hereditary enemies. In 1641 he published a series of tractates against them, and these were followed, after intervals of peace, by new attacks in 1649 and 1656. In the last year, the Jesuits succeeded in bringing about his expulsion from the Sorbonne, after Arnauld had expressed his doubt whether the famous five propositions of Jansenius were really to be found in the book of the Bishop of Ypres. Since 1648 he had been living at the Port-Royal-des-Champs (q.v.), in friendship with Nicole, and with the great Pascal, the material for whose *Provincial Letters* Arnauld is said to have supplied. After the Jansenist controversy had been set at rest by the Peace of Clement IX., in 1668, Arnauld came into conflict with the Calvinists, whom he attacked in his *La perpétuité de la foi de l'église catholique défendue* (1669), written in collaboration with Nicole and followed by the *Le renversement de la morale de Jésus-Christ par la doctrine des Calvinistes* (1672), and the *L'impiété de la morale des Calvinistes* (1675). Although he enjoyed for a time the protection of Louis XIV., and seems to have been in close touch with the powers at Rome, Arnauld, in 1679, was forced to flee to Belgium, owing to the unrelenting hostility of the Jesuits. In exile the old man continued his feverish activity. After 1680 he plunged into a bitter controversy with his old friend Malebranche, concerning the latter's theory of grace—a dispute in which Arnauld with all his passionate impulses, and imbittered no doubt by years of persecution, seems to have gone far beyond the bounds of discretion and fairness. In 1681, too, he published a defense of the English Catholics in reply to the accusations brought against them in connection with the Titus Oates episode, in which Arnauld strangely enough took up the cause of his ancient enemies, the Jesuits. He also wrote a book directed against William of Orange, calling him "a new Absalom, a new Herod, a new Cromwell" (1689). He died August 8, 1694, near Liège, shortly after he had written a work entitled *Réflexions sur l'éloquence des prédicateurs.* The title of the 'great Arnauld' was given him by the Jansenists, one of whose foremost champions he was. His voluminous writings, comprising over 100 volumes in their original editions, were published in 48 volumes at Lausanne (1775-83), the last volume being a biography of Arnauld.

ARNAULD, JACQUELINE MARIE (1591-1661). A French abbess, usually called by her conventual name, Marie Angélique de Sainte Madeleine. She was the daughter of the celebrated advocate, Antoine Arnauld. In her ninth year she assumed the dress of a novice; and concealing her age, her father induced the Pope to nominate her abbess of Port-Royal-des-Champs when she was a little over 11 years old. At first she longed for the freedom of the world, but in 1608 a sermon fully converted her. She then established discipline of especial severity, and became famous for her piety. Like the rest of her family, she was a Jansenist. She was afterwards superior of a new religious community in Paris; then prioress at Port-Royal, where her sister Agnes was abbess. She died in the convent of Port-Royal, Paris. See her life by Frances Martin (London, 1873).

ARNAULD D'ANDILLY, ROBERT (1588-1674). A French writer, born in Paris. He was the eldest son of Antoine Arnauld, the advocate, and brother of the great Arnauld, and was a person of considerable consequence at the French court, where his influence was beneficial. At the age of 55 he retired to the solitude of Port-Royal-des-Champs, where he devoted himself to religious history and biography. His chief works are translations, such as those of the *Confessions de Saint Augustin*, and his *Vies des Saints Pères du désert* (1668), translated into English as *Lives of the Fathers of the Desert* (1757). He also wrote some religious verse.

ARNAULT, är'nō', ANTOINE VINCENT (1766-1834). A French poet and dramatist. He was born in Paris, January 1, 1766, and died at Goderville, September 16, 1834. He is remembered for his satirical fables, for his *Souvenirs d'un sexagénaire* (4 vols., 1833), which contain many interesting facts concerning the inner history of France up to 1804; and, most of all, for several graceful poems, one of which, "La Feuille," is known to every French school child. He first obtained celebrity through his tragedies, *Marius à Minturnes* (1791) and *Lucrèce* (1792), and wrote the libretti to Méhul's operas, *Horatius Coclès* and *Phrosine et Mélidore.* His tragedy *Les Vénétiens* was produced at the Théâtre Français, in Paris, September 12, 1798, and was very successful. Upon the second restoration of the Bourbon dynasty, Arnault was officially included in the proscription of 1816 and fled to Belgium, where he wrote his two books of fables. These books, together with six others of a similar nature, written in 1813, were published in 1826 under the title of *Fables et poésies.* Arnault was a representative of classicism and a pronounced opponent of the romantic school. In 1819 he collaborated with Jay, Jouy, and De Norvins in the publication of the once famous *Biographie nouvelle des contemporains* (8 vols., 1820-25). In recognition of his celebrated biography *Vie politique et militaire de Napoléon* (2 vols., 1822-26), a work full of curious facts and piquant revelations, Napoleon, while at Elba, settled upon the author a legacy of 100,000 francs. The works of Arnault were edited by himself in 1818, 1823, and 1827; all of these editions are somewhat incomplete.

ARNDT, ärnt, ERNST MORITZ (1769-1860). A distinguished German poet and patriot. He was born at Schoritz, which was then in Sweden, December 26, 1769. His father had been a serf, but achieved a sturdy peasant independence, and designed Arndt for the ministry. He has described his early years delightfully in *Märchen und Jugenderinnerungen* (1818). He studied at Greifswald and Jena, and was influenced especially by Goethe, Fichte, Klopstock, Bürger, and Voss. After he left the university he made journeys in Austria, Hungary, France, and Italy, and published an account of these travels in 1802. The first of his many political services was rendered in his book, *Versuch einer Geschichte der Leibeigenschaft in Pommern und Rügen* (1803), which contributed greatly to the mitigation and partial abolition of serfdom. He became privatdocent at Greifswald in 1800, and was made professor there in 1806. After the battle of Jena he fled to Sweden, and there, in 1807, he began to issue stirring appeals against Napoleon, under the title *Der Geist der Zeit.* He returned after three years to his professorial work. In 1812 he sought refuge in Russia, called thither by Baron von Stein, the great German statesman, who was there organizing the agitation against Napoleon. Arndt's finest poems—among them "Was ist des Deutschen Vaterland," and "Der Gott der Eisen wachsen liess"—belong to this period; also stirring appeals in prose, such as *Deutscher Volkskatechismus* (1812); *Was bedeutet Landwehr und Landsturm?* (1813); *Der Rhein, Deutschlands Strom aber nicht Deutschlands Grenze* (1813); collated in *Schriften für und an meine lieben Deutschen* (3 vols., 1845). After the French disaster in Russia (1812), he returned to Prussia, in which his hopes of German unity centred, and gave himself up to the agitation that resulted in the War of Liberation, which culminated in the battle of Leipzig (1813). In 1817 he married a sister of the great Liberal preacher and philosophic theologian, Schleiermacher, and in 1818 was made professor of history in the newly established university at Bonn. As his liberal views were at variance with the Government's reactionary policy, he was soon suspended (1820), and passed the next twenty years in honorable and honored retirement, writing historical essays of minor value, and his interesting *Erinnerungen aus meinem äussern Leben.* On his accession to the Prussian throne, Frederick William IV. restored Arndt to his professorship (1840). German unity was still his dream. He took a lively interest in the events of 1848, and was one of the deputation to offer to the Prussian King the Imperial crown of Germany. The ninetieth birthday of Father Arndt, as he had come to be called, was celebrated throughout his still disunited country: a month later he died at Bonn, January 29, 1860. Eleven years later the ideal of his life was realized by the proclamation of the German Empire at Versailles. Arndt was neither a great scholar nor a great poet, but he was a noble character and a manly patriot. Editions of his war songs are numberless. His *Erinnerungen* form the basis of E. M. Seeley's *Life and Adventures of E. M. Arndt* (1879). There are German *Lives* by Schenkel (2d ed., Elberfeld, 1869); Langenberg (Bonn, 1869); and Baur (Hamburg, 1882); and a volume of Arndt's *Letters to a Friend* (*Briefe an eine Freundin*), edited by Langenberg (Berlin, 1878).

ARNDT, or **ARND**, Johann (1555-1621). A German Lutheran divine. He was born at Ballenstedt, Anhalt, December 27, 1555, and was educated at Helmstedt, Wittenberg, Strassburg, and Basel. He became pastor at Badeborn, Anhalt, in 1583, but was deposed in 1590 because he resisted the order of Duke John George to remove the pictures from his church and cease the use of exorcism in baptism. Later that year he was appointed to a place at Quedlinburg, but was glad to leave it in 1599 and go to Brunswick, because he had fallen into disfavor with the townspeople. His ardent piety was an offense to the dead orthodoxy of his associates, and he welcomed the call to Eisleben (1608), but only stayed until 1611, when he became general superintendent at Celle, Hanover, and there died, May 11, 1621. His enduring fame rests upon his *True Christianity* (Magdeburg, 1610), and his *Garden of Paradise* (Magdeburg, 1612); new editions of both, with biographical sketch by F. W. Krummacher, second edition (Leipzig, 1850); best English translation of the former is that edited by Charles F. Schaeffer (Philadelphia, 1868); of the latter there is an English translation by A. W. Boehm (London, 1716). Arndt nourished his soul upon the Scriptures and the mystics, and his works develop that spirit which afterwards was called pietistic, but is none the less devotional and practical. For his biography consult: F. Arndt (Berlin, 1838), and the Krummacher sketch quoted above.

ARNDT, Wilhelm (1838-95). A German historian. He was born at Lobsens, Province of Posen, Prussia, and after studying history at the University of Göttingen became established at the University of Leipzig. He published *Kleine Denkmäler aus der Merowingerzeit* (1874), and *Schrifttafeln zur Erlernung der lateinischen Paläographie* (third edition, 1897). He was for many years collaborator on the *Monumenta Germaniæ Historica,* and in 1881 published at Leipzig a second edition of Goethe's *Letters to the Countess Auguste zu Stolberg.*

ARNDTS VON ARNESBERG, Ludwig (1803-78). A German jurist, who did much to develop the science of jurisprudence. He was born in Arnsberg, Prussia, and was successively professor of jurisprudence in Bonn, Breslau, Munich, and Vienna universities, being at the last institution from 1855 until his death. He favored warmly Austria's claims for admission to the German Empire, and used his influence to that end in 1848, when in the National Assembly of Frankfort. He was knighted by Austria in 1871. His best-known works are the *Lehrbuch der Pandekten* (ed. 13, 1886), and the *Juristische Encyclopädie und Methodologie* (ed. 8, 1887).

ARNE, ärn, Thomas Augustine (1710-78). An eminent English composer. He was born in London, and received his early education at Eton. His father, who was an upholsterer, intended to educate him for the bar; but the love of music was too strong to be restrained. Young Arne became skillful as a violin-player, forming his style chiefly on the model of Corelli; and his zeal in the study of music induced his sister (afterwards celebrated as Mrs. Cibber) to cultivate her excellent voice. He wrote for her a part in his first opera, *Rosamond,* which was first performed with great success in 1733. Next followed his comic operetta, *Tom Thumb, or the Opera of Operas;* and afterwards his *Comus* (1738), which displayed greater cultivation of style. He married a singer, Cecilia Young (1736), and after a successful visit to Ireland was engaged as composer to Drury Lane Theatre, and wrote many vocal pieces for the Vauxhall concerts. The national air "Rule Britannia," which was originally given in a popular performance, the masque of *Alfred,* is of his composition. He composed also two oratorios, *Abel* and *Judith,* a number of operas, including *Artaxerxes,* in the Italian style (1762). His genius was better adapted to simple pastoral melody than to great dramatic compositions, and he wrote many glees, catches, canons, and songs, and the music to Garrick's "Ode to Shakespeare" for the Jubilee at Stratford-on-Avon in 1769.

His son, Michael (1741-86), was also a composer. He died in London. Consult W. A. Barrett, *English Glee and Part Songs* (London, 1886).

ARNETH, är′nĕt, ALFRED, Ritter von (1819-97). An eminent Austrian historian. He was born in Vienna, and after completing a course of legal studies entered the Austrian Government service as an employee in the Imperial archives at Vienna. In 1848 Arneth was sent to the Frankfort Parliament as a representative from the district of Neunkirchen, and in 1861 was elected to the Diet of Lower Austria. In 1868 he was appointed director of the State archives, and in 1869 he was nominated by the Emperor a life member of the Austrian Upper Chamber. In 1879 he was chosen president of the Imperial Academy of Sciences at Vienna. Arneth wrote a number of scholarly works on Eighteenth-Century Austrian history, especially the eventful reign of Maria Theresa. His chief works are: *Geschichte Maria Theresias* (10 vols., 1863-79); *Prinz Eugen von Savoyen* (3 vols., 1858-59); *Joseph II. und Leopold von Toscana, ihr Briefwechsel* (2 vols., 1872); *Marie Antoinette: Correspondance secrète entre Marie Thérèse et le comte de Mercy-Argenteau* (3 vols., 1874). He left an interesting autobiography, *Aus meinem Leben* (Vienna, 1891).

ARNETH, JOSEPH CALASANZA, Ritter von (1791-1863). An Austrian numismatist and archæologist, born at Leopoldschlag, Upper Austria. He became custodian of the Cabinet of Coins and Antiques in Vienna, and director of that institution in 1840, in which capacity he rendered very valuable services to the department of numismatics. Among his more important works are: *Synopsis Numorum Græcorum* (1837); *Synopsis Numorum Romanorum* (1842); *Das k. k. Münz- und Antikenkabinett* (1845); *Die antiken Kameen des k. k. Münz- und Antikenkabinetts* (1849); *Die Cinque-Cento-Kameen und Arbeiten des Benvenuto Cellini und seiner Zeitgenossen* (1858).

ARNHEIM, ärn′hīm. See ARNHEM.

ARNHEIM, HANS GEORG. See ARNIM, HANS GEORG.

ARN′HEM (anciently, Lat. *Arenacum*). The capital of the Dutch Province of Gelderland, situated on the Rhine, 35 miles southeast of Utrecht (Map: Netherlands, D 3). It is a place of historic interest. It has elegant promenades constructed on the ramparts of the old city. One of its notable edifices is the Groote-Kerk, or Dutch Reformed Church, which was begun in 1452. It has a tower 318 feet high, and contains the tomb of the Duke of Gelderland, the opponent of Charles V. The town hall, erected in the Fifteenth Century, is called the Duivelhuis, from its grotesque decorations. Arnhem has an art school, and a normal school for women, besides an art museum, the Museum van Oudheden en Kunst, and public library. The trade of the town is with Germany, chiefly in grain and tobacco, while it manufactures furniture, wagons, mirrors, and scientific instruments. Arnhem was formerly the residence of the Dukes of Gelderland. In the Thirteenth Century and during the Middle Ages it was a member of the Hanseatic League. It was taken by the French in 1672, and stormed by the Prussians in 1813. Population, in 1895, 54,180; in 1900, 56,812.

AR′NICA (commonly given as corruption of *ptarmica*; doubtful). A genus of plants belonging to the natural order Compositæ. The species are few in number and are found only in the north temperate and Arctic regions. The root, leaves, and flowers of the mountain arnica (*Arnica montana*), sometimes called mountain tobacco, are much valued in medicine, and are administered in various forms as a stimulant in paralytic affections, typhoid fevers, and other diseases. They are also applied with much benefit to bruises, to promote the reabsorption of extravasated blood. They contain a peculiar volatile oil, a resin, an extractive matter, and a bitter principle called arnicin. The root is perennial and crooked, the stem about 2 feet high, simple or little branched, with few leaves, bearing on the summit a head of flowers of dark golden yellow, often 2 inches in breadth. It flowers from June to August, forms an ornament of mountain meadows in Germany and Switzerland, and is found, upon the Continent of Europe, as far south as Portugal and as far north as Lapland. Other species have locally the same qualities attributed to them as *Arnica montana*. For illustration, see DICOTYLEDONS and FLOWER.

ARNIGIO, är-nē′jō, BARTOLOMMEO (1523-77). An Italian poet who was born at Brescia, and died there of the plague.

ARNIM, är′nĭm, ELISABETH VON, better known as BETTINA (1785-1859). A sister of Clemens Brentano, and wife of Achim von Arnim, born at Frankfort-on-the-Main. She is noted chiefly for her friendship with Goethe (1807-11) and her pretended *Correspondence of Goethe with a Child* (*Goethes Briefwechsel mit einem Kinde*) (1838), which is in large part fictitious. Genuine sonnets of Goethe in it were addressed, not to her, but to Minna Herzlieb. As a work of fiction its merits are great. It is original, fresh, lively, and graphic, though with the usual romantic faults of construction; and in its speculative pages it is unintelligible. A similar volume of *Correspondence* with Caroline von Günderode is equally interesting, as is also a collection of real *Letters* to and from her brother Clemens. She was a true member of a brilliantly eccentric family, keen, witty, capricious, vain, untruthful. Her translation of her *Correspondence* with Goethe into English is one of the curiosities of literature.

ARNIM, är′nĭm, or **ARNHEIM**, ärn′hīm, HANS GEORG VON (1581-1641). A German general in the Thirty Years' War. He was born at Boitzenburg in Brandenburg. He fought under Gustavus Adolphus against Russia in 1613, served in the Polish forces, and in 1626 entered the Imperial service under Wallenstein and was appointed a field-marshal. Being a Protestant, he left the Imperial service on account of the Edict of Restitution, entered that of the Elector John George of Saxony, and was in command of the left wing of the army of Gustavus Adolphus at Breitenfeld (1631). He was one of the principal agents in the negotiations between John George and Wallenstein, which were terminated by the latter's death in 1634. After this he defeated the Imperialists at Liegnitz and operated in conjunction with Baner in Bohemia. In 1635 John George abandoned the Protestant cause, making peace with the Emperor Ferdinand

II., and Arnim now left the Saxon service. He was seized by Oxenstierna in March, 1637, for alleged intrigues against Sweden, and was taken to Stockholm, but escaped to Hamburg in November, 1638, and thereafter devoted himself to freeing Germany from foreign domination. He was carrying on a campaign, as lieutenant-general of the Imperial and Saxon forces against the French and Swedes, when he died at Dresden, April 18, 1641.

Consult: Helbig, *Wallenstein und Arnim, 1632-34* (Dresden, 1850); Irmer, "G. von Arnim als kaiserlicher Feldherr in Pommern und Polen," in *Forschungen zur deutschen Geschichte* (Göttingen, 1879), and *H. G. von Arnim, Lebensbild* (Leipzig, 1894). See THIRTY YEARS' WAR; WALLENSTEIN.

ARNIM, HARRY, Count von (1824-81). A German diplomat, born at Moitzelfitz, Pomerania. He studied law and entered the diplomatic service: was appointed ambassador to the Pope in 1864, and during the Vatican Council of 1869-70, as ambassador of the North German Confederation, supported the German bishops who opposed the dogma of infallibility. He was made a count in 1870, and during the next year took a prominent part in the negotiations preceding the Treaty of Frankfort. During 1872-74 he was ambassador to France, but as he was opposed to the policy of Bismarck, the latter secured his transfer to Constantinople, and a little later caused him to be arrested on the charge of stealing and publishing State documents from the German Embassy in Paris. For this he was sentenced to nine months' imprisonment. But he escaped punishment by remaining outside of the empire, chiefly in Austria, where he published many pamphlets attacking Bismarck. He died at Nice.

ARNIM, LUDWIG JOACHIM (ACHIM) von (1781-1831). A German novelist and poet, born in Berlin. He is best known for a collection of folk-songs made with Clemens Brentano, and published (1806-08) under the title of the initial song, *Des Knaben Wunderhorn*. He studied the natural sciences at Göttingen and Halle, and received the degree of M.D., but never practiced medicine. His first work, *Theorie der elektrischen Erscheinungen*, showed a leaning to the supernatural, common among the German romanticists, still more strongly marked in his *Hollins Liebeleben* (1802), and *Ariels Offenbarungen* (1804). *Der Wintergarten* (1809), a collection of romantic tales, was followed in 1810 by a striking novel, *Die Gräfin Dolores*. *Halle und Jerusalem* (1811) is a humorous romance, and *Isabelle von Ägypten* (1811) a mediocre novel. Two years later he collected his dramas. In 1817 he produced his last and best romance, *Die Kronenwächter*, a story of the days of Emperor Maximilian. His works are careless in form, incoherent in structure, and romantically whimsical, but they show a remarkable originality of invention. They were collected, with an introduction by Wilhelm Grimm, in twenty volumes (1839-48). There is a brilliant eulogy of Arnim in Heine's *Deutschland*.

AR'NO (anciently, Lat. *Arnus*). One of the largest rivers in Italy, rising on Mount Falterona in the Apennines, at the eastern end of Tuscany, at an elevation of over 5000 feet (Map: Italy, E 4). Near Arezzo it is connected with the Tiber through the canalized portion of the Chiana, and near that place enters the Val d' Arno, one of the most fruitful and beautiful valleys of Italy. It passes Florence and enters the Mediterranean six miles west of Pisa. In former times that city was situated at its mouth. The entire length of the Arno is about 140 miles; its most important tributaries are the Chiana and Sieve. It is navigable for barges as far as Florence. The Arno is subject to frequent rises, and in some parts of its course the banks are protected by dykes.

ARNO'BIUS, called AFER. An early Christian writer sometimes called Arnobius the Elder. He lived about A.D. 300, and was a native of Numidia in Africa. He was a professor of rhetoric at Sicca, and although at first an opponent of the Christians, was early converted. His fame rests chiefly upon his treatise, in seven books, entitled *Adversus Nationes*, which displays slight knowledge of Christianity, but is of interest as showing the arguments then employed in the conversion of heathendom. An English translation has been published under the title *The Seven Books of Arnobius Against the Heathen* (New York, 1888). There is an edition of the original (Latin) text by Reifferscheid (Leipzig, 1875).

ARNOLD, är'nold, ABRAHAM KERNS (1837—). An American soldier. He was born in Bedford, Pa., graduated at West Point in 1859, was appointed a brevet second lieutenant in the same year, became a first lieutenant in 1861, and served with marked ability throughout the Civil War, being brevetted captain in June, 1862, and major in May, 1864, "for gallant and meritorious services" at Gaines's Mill and Todd's Tavern, respectively. He received a regular major's commission in June, 1869, and became lieutenant-colonel in 1886 and colonel in 1891. Appointed brigadier-general in 1898, he commanded the second division of the Seventh Army Corps in Cuba during the war with Spain. He is the author of *Notes on Horses for Cavalry Service* (New York, 1869).

ARNOLD, BENEDICT (1615-78). A colonial governor of Rhode Island. He was born in England, but was brought by his father to America in 1636. He removed to Newport in 1653, and became first governor of Rhode Island (under the new charter) in 1663, and was reëlected in 1664, 1669, 1677, and 1678. He seems to have built the celebrated windmill in Newport, whose erection was long ascribed to the Northmen.

ARNOLD, BENEDICT (1741-1801). An American general, known in the annals of the American Revolution as 'The Traitor.' He was descended from a prominent Rhode Island family, and was born in Norwich, Conn., January 14, 1741. He received a fair education, but being ambitious and reckless, twice left his home and joined the Provincial troops on the northern frontier. In 1762 he established himself at New Haven, as bookseller and druggist, embarked in the West India trade, prospered, and in 1767 married Margaret Mansfield, a lady of good family, who died in 1775. On receipt (April 20, 1775) of the news of the battle of Lexington, Arnold led a military company to Cambridge, and proposed an expedition to capture Ticonderoga and Crown Point, and was commissioned as colonel to raise troops in western Massachusetts, but was obliged to join as a volunteer, the expedition under Ethan Allen, already on the way thither. Prevented by the Connecticut authorities from taking command of Ticonderoga after its capture, he armed a vessel and with a few troops took Saint Johns, together with a royal sloop and several bateaux. Jealous persons in Connecticut prompted the Continental Congress to question his capacity and conduct, and, while planning the conquest of Canada, he was superseded, but was selected by Washington to head an expedition against Quebec. Late in 1775 he led 1100 men through the forests of Maine, enduring great hardships, and on December 3 was joined by General Montgomery. In the daring but unsuccessful assault, December 31, in which Montgomery fell, Arnold was wounded, but recovering, took command at Montreal, Congress having made him brigadier-general. In June, 1776, he retreated by way of Lake Champlain, and was immediately selected to construct and command a fleet to control that important body of water. On October 11, near Valcour Island, he attacked a British fleet twice the size of his own; held his position till night, and then, aided by the darkness, stole with his crippled flotilla between the enemy's lines and escaped.

In spite of Washington's confidence in Arnold, the latter's enemies influenced Congress, and in 1777 five of his inferiors in rank were made major-generals—a slight which his sensitive and ambitious nature could not forgive—yet at Washington's request he did not resign. The British having invaded Connecticut, he joined the militia raised to repel them, and at the battle of Ridgefield showed remarkable courage, barely escaping death. Congress now appointed him a major-general, but still denied him proper relative rank. He coöperated with Washington in opposing the advance of Howe toward Philadelphia, and was appointed to act with General Schuyler in checking the progress of Burgoyne through eastern New York. He raised the siege of Fort Schuyler (Stanwix), and at the battle of Bemis's Heights, September 19, 1777, was recklessly prominent, but General Gates, who by intrigue had superseded Schuyler, became jealous of Arnold; a quarrel ensued, and Arnold was deprived of his command. When the second battle of Saratoga occurred (October 7), Arnold defied the efforts of Gates to keep him in the background, and, rushing into the fight, was among the foremost leaders in the final assault which resulted in the capture of Burgoyne's army; after which Congress grudgingly gave him the rank he had so long claimed. In May, 1778, he joined the camp at Valley Forge, but, being incapacitated for active service, was placed in command of Philadelphia after the British retired. Here he married, April, 1779, Peggy (Margaret) Shippen, a beautiful and cultivated woman, youngest daughter of Edward Shippen, a loyalist, and afterwards chief justice of the State. Moving in fashionable society and living extravagantly, Arnold naturally incurred criticism, and to this the executive council of Pennsylvania added definite charges of arbitrary exercise of military authority and of favoritism to Tories. At his request a court-martial was appointed, but nearly a year elapsed before it was held (January, 1780), when he defended himself without counsel and was acquitted of intentional wrongdoing, but was sentenced to be reprimanded by Washington, who, while rebuking Arnold, urged him to regain the esteem of his countrymen: but this disgrace, added to the injustice of Congress and the feeling that his sacrifices of health and property were unappreciated, led Arnold to reconsider the overtures of treason made some months, if not years, before. In August, 1780, he took command of West Point, which through a correspondence with Major André (q.v.) he offered to surrender to the British; and to consummate the plan, Arnold and André met at midnight on the shore of the Hudson (September 21); but the capture of André, September 23, frustrated the scheme, and Arnold fled to the British sloop of war *Vulture*.

Having been made a brigadier-general in the British Army, Arnold in December headed a naval expedition against Virginia, but did little besides destroying property along the James River and burning Richmond. In 1781 he led another expedition against Connecticut, which resulted in the burning of New London and the massacre of the surrendered garrison of Fort Griswold. In December, 1781, he sailed for England with his family, who were pensioned by the British Government. He himself received £6315 (about $31,575) for his alleged losses in joining the British, was kindly treated by the royal family, and at the King's request prepared a plan for reconciling the colonies; but received either neglect or abuse from both political parties, and, failing to get a position in the army, was forced to take up his old trade of merchant. The years 1787-91 were chiefly spent at Saint John's, N. B., where he carried on trade with the West Indies, but he returned with his family to London in the summer of 1791. On the breaking out of the war between England and France he was exposed to great risks in prosecuting his West India trade, and on one occasion was captured by a French ship, but escaped with his customary daring. The Government still refusing to give him active service in the army, he strove by fitting out privateers against France to recover his lost fortune, but being unsuccessful, weighed down by debt, and despised by two continents, he sank into a state of melancholy, and died June 14, 1801, regretting, tradition says, his treason.

His wife, who appears to have been guiltless of any complicity in his treason, and who had great strength of character, died in 1804. By his first wife, Arnold had three sons, and by his second wife, several other children. His eldest sons received commissions in the British Army: and the second, James Robertson, who inherited his father's daring and military ability, rose to be a lieutenant-general, was made aide-de-camp to King William IV., and was created a knight. Others of Arnold's children held honorable positions, and one of his grandsons, Captain William Traill Arnold, a brave fighter, was killed in the Crimean War. Consult: Sparks, *Life of Benedict Arnold* (Boston, 1838): Arnold, *Life of Benedict Arnold* (Chicago, 1880).

ARNOLD, är'nôlt, CHRISTOPH (1650-95). A German peasant (born near Leipzig), who carried out interesting astronomical observations and wrote *Göttliche Gnadenzeichen, in einem Sonnenwunder vor Augen gestellt* (Leipzig, 1692). He constructed an observatory at his own house, and devoted himself to astronomical studies. He was the first to observe the comets of 1682 and

1686, and observed the transit of Mercury in the fall of 1690. An account of the latter observation is given in the work before mentioned.

ARNOLD, är′nold, Sir Edwin (1832-1904). A popular English author, born at Gravesend, June 10, 1832. From King's School, Rochester, he went to King's College, London, and thence to University College, Oxford, where he won the Newdigate Prize for 1853. In 1854-56, he was master of King Edward's School, Birmingham; and in 1856 he became principal of the Government College at Poona, Bombay. Returning to England in 1861, he obtained a place on the editorial staff of the *Daily Telegraph*. At the death of Thornton Hunt he became chief editor of the paper. While at this exacting work he found time to translate a volume of Greek poems and to produce his most remarkable work, *The Light of Asia* (1879), a production notable for its lofty philosophy and the vividness and reality with which the scenery, climate, manners, and people of Hindustan, as they were 2000 years ago, are portrayed. Its full title is *The Light of Asia; or, The Great Renunciation; being the Life and Teachings of Gautama (as told in verse by an Indian Buddhist)*. He subsequently published *Pearls of the Faith* (1883); *The Gulistan* (1889); *Poems, National and Non-Oriental* (1888); *The Light of the World* (1891); *The Tenth Muse and other Poems* (1895); *East and West* (1896); *The Voyage of Ithobal* (1901), and numerous other works. He was made a companion of the Star of India in 1877; a Knight Commander of the Indian Empire in 1888, and was decorated by the Sultan of Turkey and other Oriental rulers. He frequently visited the United States, reading there in 1891.

During the ten years following the publication of *The Light of Asia*, Arnold attained to his highest popularity. In the final estimate of his poetry, it will be discovered that his immense vogue was due largely to the freshness of his subject. He above all others popularized the philosophy of India. He was excellent at translation and paraphrase, but lacked the inventive genius of the great poets.

ARNOLD, George (1834-65). An American poet and humorist, born in New York City. As a child, while living in Illinois, he showed talent for drawing and, on his return to the East, studied with a portrait painter in New York. He abandoned this career for literature, wrote several unimportant biographies, and contributed stories, poems, sketches, and critical essays to various periodicals, especially *Vanity Fair*, in which appeared the earlier of his once famous *McArone Papers* (begun in 1860). He served as a soldier in the Civil War. William Winter edited his *Poems* with a Memoir (Boston, 1870; new ed., 1889). Some of these are characterized by melodious sweetness and pathos, but recent anthologists pay only slight attention to them.

ARNOLD, är′nȯlt, Gottfried (1666-1714). A German theologian. He was born at Annaberg, Saxony, studied theology at Wittenberg, and in 1697 was appointed professor of history at Giessen. His chief work is his *Unparteiische Kirchen und Ketzerhistorie* (1699-1700), which, by reason of its spirit of toleration, may be said to have marked an epoch in church history. During his life he was constantly exposed to attacks from the orthodox party. His fifty-three other works include *Die erste Liebe* (edited by Lämmert, 1844), and *Die Verklärung Jesu Christi in der Seele* (1704). Consult Dibelius, *Gottfried Arnold* (Berlin, 1873).

ARNOLD, är′nold, Isaac Newton (1815-84). An American lawyer and politician. He was born in Hartwick, N. Y., taught school, studied law, was admitted to the bar in 1835, and in the following year removed to Chicago, where he soon became prominent as a politician. He was elected to Congress in 1860 and served for two terms, part of the time as chairman of the important committee on manufactures. He was also conspicuous as an advocate of the immediate abolition of slavery. For many years he was an intimate friend of Abraham Lincoln, and he published an able *Biography of Lincoln* in 1866. He also wrote what is probably the best *Life of Benedict Arnold* (1880). Consult E. B. Washburne, "Isaac Newton Arnold," an address delivered before the Chicago Historical Society, of which Arnold was for many years president (Chicago, 1884).

ARNOLD, är′nȯlt, Johann. A miller of the Neumark (Brandenburg), who lived in the time of Frederick II. of Prussia, and gave rise to a remarkable legal process. He complained to the King that his landlord, by making a pond, had taken away water from the mill; that he (Arnold) had therefore refused to pay rent for the mill, of which he held a lease, but had been condemned to pay by the unanimous decisions of two legal courts. The King took up the case, and, regarding it as an oppression of the poor, reversed the decisions of the courts, dismissed his high chancellor, imprisoned several other officers of justice, and gave orders that restitution should be made to the miller. Soon afterwards the King died, and under Frederick William II. the case was more coolly investigated, and the condemned persons were exonerated and recompensed for their losses by the State.

ARNOLD, Johann Georg Daniel (1780-1829). A jurist and poet of Alsace. He was born at Strassburg, studied there, and at Göttingen and Paris, and from 1806 to 1809 was instructor in French civil law in the law school at Coblenz. In the latter year he was appointed to the chair of history at Strassburg, and in 1811 was transferred to that of Roman law. His great work in jurisprudence is the *Elementa Juris Civilis Justinianei cum Codice Napoleoneo et Reliquis Legum Codicibus Collata* (1812). He also wrote in High-German, "Blessigs Totenfeier," and numerous other lyrics, and in the Strassburg dialect, *Der Pfingstmontag* (1816), a comedy in rhymed Alexandrines, much praised by Goethe.

ARNOLD, är′nold, Lewis G. (1815-71). An American soldier. He was born in New Jersey, graduated from West Point in 1837, and served as second lieutenant in the second Seminole War (1837-38). During the Mexican War, as first lieutenant in an artillery company, he accompanied General Scott's army and participated (1847) in all the operations from Vera Cruz to Mexico City. He was brevetted captain for bravery (August 20) at Churubusco, and major for gallant conduct (September 13) at Chapultepec. During the Civil War he helped repel the Confederate attack upon Santa Rosa Island (October 9, 1861), and distinguished himself, as executive officer, in the defense of Fort Pickens during the bombardments of November, 1861, January, 1862, and May, 1862. He was then appointed brigadier-general of volunteers, and commanded successively the department of Florida and the Union forces at New Orleans and Algiers, La., but was disabled by a stroke of paralysis (November, 1862), and was retired from the service, as lieutenant-colonel of regulars, in August, 1864.

ARNOLD, Matthew (1822-88). An English poet and essayist. He was a son of Dr. Thomas Arnold, the famous headmaster of Rugby, and was born December 24, 1822, at Laleham, a village near Staines, in the valley of the Thames. With the exception of a year (1836-37) at Winchester under Dr. Moberly, later Bishop of Salisbury, Arnold passed his school days at Rugby, where his "Alaric at Rome" won the prize for poetry (1840). He was elected a classical scholar of Balliol College, Oxford, in November, 1840, but did not go into residence till October of the next year. In 1843 he gained the Newdigate prize with a poem entitled "Cromwell," and in March, 1845, was elected a fellow of Oriel. Among his colleagues at Oriel were Dean Church, John Earle, subsequently known as professor of Anglo-Saxon in the university, and Arthur Hugh Clough, to whom he has paid tribute in "Thyrsis," justly ranked with "Lycidas" and "Adonaïs," as one of the finest elegiac poems in the language. After a short period of teaching the classics in the fifth form at Rugby, he became, in 1847, private secretary to the Marquis of Lansdowne, Lord President of the Council, who in 1851 appointed him an inspector of schools. This inspectorship he held until November, 1886. He appears ever to have entertained repugnance toward the details of the official routine—the hearing of recitations by students of training colleges, and the correction of endless examination papers. Yet even here his influence was felt by the English public, and his annual reports, appearing from 1852 to 1882, met with an interest seldom manifested toward such publications. From 1857 to 1867 he was successor to Wharton and Keble in the more congenial post of professor of poetry at Oxford. It was then by his famous series of prelections *On Translating Homer* and *On the Study of Celtic Literature*, that he began that reform of English criticism so important in the history of Nineteenth-Century literature. Three times, in 1859, 1865, and 1885, he was commissioned to visit the Continent for study of the school discipline and methods of education in vogue there; and in 1883-84 he came to the United States as a lecturer. The visit to America was repeated in 1886. He died April 15, 1888, and was buried in the churchyard of All Saints at Laleham.

Like Dryden and Coleridge, Arnold gained high distinction both as critic and as poet. Even his prize poems, though scarce foreshadowing his later work, display more talent than is usual with a poet's first efforts. In "Alaric at Rome" (Rugby, 1840; reprinted, 1893), a difficult stanza is managed with skill; and the heroic verse of "Cromwell" is smooth and agreeable. In 1849, under the initial "A," he published *The Strayed Reveller and Other Poems*, containing the beautiful "Mycerinus" and "The Forsaken Merman." This volume was followed, still under 'A,' by *Empedocles on Etna and Other Poems* (1852), where first appeared the narrative "Tristram and Iseult," and several lovely lyrics, as "A Summer Night," "The Youth of Nature," "The Youth of Man," and "Faded Leaves." In 1853, Arnold threw off the mask of anonymity. The *Poems* of that year (3d ed., 1857) include "Sohrab and Rustum," his popular poem, founded upon a story in Firdausi's *Shah-Nameh*; "Requiescat," "The Scholar-Gipsy," and many pieces from the earlier collections. "Empedocles," however, was omitted as structurally weak. Time now singles it out as one of Arnold's most attractive dramatic poems. The songs of Callicles, the harp-player, are among his choicest lyrics. The volume was prefaced with an admirable statement of the author's aim—an essay since famous not only for its brilliancy but also as indicating another field in which Arnold was to become well known. Arnold's other volumes of verse comprise *Poems*, Second Series (1855), of which the chief new poem is the magnificent episode "Balder Dead," and in which four of the songs of Callicles are grouped as "The Harp-Player on Etna"; *Merope*, a rather frigid tragedy (1858); *New Poems* (1867), memorable for "Thyrsis," and containing "Empedocles on Etna" revived; *Poems* (the first collected edition, 1869; reissued, 1877), in which was included "Rugby Chapel," that noble elegy on the death of his father; and a fine edition complete in three volumes (1885), containing "Westminster Abbey," a splendid elegy on Dean Stanley. In this edition Arnold classified his poems as Early Poems, Narrative Poems, Sonnets, Lyric Poems, Elegiac Poems, Dramatic Poems, and Later Poems—a division since carefully observed by editors.

It will be noted that the bulk of Arnold's verse is relatively small—a fact doubtless to be attributed to the preoccupation of official duties. It is equally notable that throughout his body of verse a level of excellence is maintained so nearly invariable that at most there are perhaps not more than a round dozen titles which one would not regret to see removed. Although it can not now with accuracy be said that Arnold is not a popular poet, it is nevertheless true that he does not appeal to the wide audience of Tennyson and Browning. His poetical work will, it is certain, have always a peculiar grace for not a few. In its grave and noble music, in its stoic austerity, it will claim its own fit audience.

But it is a question whether Arnold will not in time take a place in the general mind as the third great poet of the Victorian age. On this point Arnold himself wrote: "My poems represent on the whole the main movement of mind of the last quarter of a century; and thus they will probably have their day as people become conscious to themselves of what that movement of mind is, and interested in the literary productions that reflect it. It might be fairly urged that I have less poetical sentiment than Tennyson, and less intellectual vigor and abundance than Browning; yet because I have, perhaps, more of a fusion of the two than either of them, and have more regularly applied that fusion to the main line of modern development, I am likely enough to have my turn as they have had theirs."

Among Arnold's prose writings are: *On Translating Homer* (1861-62), and the *Study of Celtic Literature* (1867), both redactions of Oxford lectures; *Essays in Criticism* (1865); *Culture and Anarchy* (1869); *Saint Paul and Protestant-*

ism (1870); *Literature and Dogma* (1873); *Mixed Essays* (1879); *Irish Essays* (1882); *Discourses in America* (1885); *Essays in Criticism*, second series (1888). Two volumes of his letters were published in 1895 under the editorship of G. W. E. Russell. These, though they are likely to add little to his literary fame, do, as his editor hoped they might, "reveal aspects of his character . . . which could be only imperfectly apprehended through the more formal medium of his published works." Besides all these, there are other theological and social essays, and reports and books on education. He also edited selections from Dr. Johnson (1878), Wordsworth (1879), Byron (1881), and Burke (1881), with noteworthy prefaces. Arnold's work in prose is not altogether uniform in value. Naturally what pertains to schools is of interest primarily to educators; although students of Arnold's style will find *A French Eton* (1864) a valuable document. Likewise much that he wrote on politics and theology, though it served its purpose, now possesses chiefly an historical value. *Literature and Dogma* and *God and the Bible*, the former of which he himself considered his most significant work, were in his own time much misunderstood. Their purpose was to assert the natural truth of the Christian religion as against its dogma, to emphasize the literary aspect of the Bible, and, in the words of Mr. Brownell, to make "each a theme, a topic of literature"—a part of that generous culture of which he was so persuasive an advocate. Arnold was among the earliest thus to apply to these subjects the methods of literary criticism—he wrote of them in a style quite new in treatises of the sort; but he failed at the time to satisfy either orthodox or radical. His permanent place as a critic is made secure by such volumes as the first series of *Essays in Criticism*. Not only is the thought here of the first order, but the style is of the best, ranking with that of Newman, his master. The essays follow the sympathetic method of Sainte-Beuve. Especially brilliant is the essay on Heine, an author from whom Arnold derived many of his ideas and the sting with which he attacked Philistinism. The essay on "Pagan and Mediæval Sentiment" is a charming contrast between Greek and mediæval ideals as represented by Theocritus and Saint Francis of Assisi. The Oxford lectures above referred to are now classics. Of the discourses delivered in America, the one on "Literature and Science" is a strong plea for literature against the encroachments of science; and the one on "Emerson," though clearly inadequate as an estimate, contains passages of great eloquence. Arnold's influence is still paramount in English criticism. Many of his phrases, such as 'sweetness and light,' the 'lyrical cry', the definition of poetry as 'a criticism of life,' the contention that criticism should be "a disinterested endeavor to learn and propagate the best that is known and thought in the world," the description of conduct as 'three-fourths of life,' the phrase 'the not-ourselves that makes for righteousness,' the division of the British public into 'Barbarians, Philistines, and Populace,' the infusion of new meaning into the terms 'Hebraism' and 'Hellenism'—all these have become common property; but more, his general manner of treating literary themes very widely prevails. Even during his lifetime his judgments in this field were received as *ex cathedra*. He did away with the pompous rhetoric and blustering animosities of the Eighteenth-Century school, and substituted therefor restraint, poise, taste—in short, the ethical element. It was thus that he introduced into English criticism a new era. What Principal Shairp has happily called 'the sparkling banter' of his occasional manner (for example, in *Culture and Anarchy*), has led to the ascription to Arnold by the careless and the unperceptive of a flippancy which, it is hardly necessary to state, was not characteristic of his temper.

It was Arnold's expressed wish that he should not be the subject of a biography. For the details of his laborious life consult the charming *Letters* cited above; for his influence on education, Fitch, *Thomas and Matthew Arnold* (New York, 1897); for the social aspect of his work, Robertson, *Modern Humanists* (London, 1891); and for some of his best recent literary appraisals, Saintsbury, *Matthew Arnold* (New York, 1899); Gates, *Three Studies in Literature* (New York, 1899); Woodberry, *Makers of Literature* (New York, 1900); Harrison, *Tennyson, Ruskin, Mill, and Other Literary Estimates* (New York, 1900); and Brownell, *Victorian Prose Masters* (New York, 1902).

ARNOLD, Richard (1828-82). An American soldier. He was born at Providence, R. I., and graduated at West Point in 1850. He was made captain of an artillery company early in 1861, served with gallantry at Bull Run (July 21, (1861), at Savage's Station (June 29, 1862), at Port Hudson (May-July, 1863), and at Fort Morgan (August, 1864), and after various promotions was brevetted major-general of volunteers in August, 1865. In 1875 he became a major in the regular service, and in 1877 he was appointed acting assistant inspector-general of the Eastern Department. In 1882 he became a lieutenant-colonel.

ARNOLD, Samuel (1740-1802). An English composer. He was educated under Dr. Nares in the Chapel Royal, and when 23 years old, was appointed to compose an opera for Covent Garden, and produced *The Maid of the Mill* (1765), which was successful. In 1776, he became composer for the Haymarket; in 1783 was appointed organist and composer to the Chapel Royal, and ten years afterwards organist in Westminster Abbey. He produced forty-three dramatic compositions and his oratorios include *The Cure of Saul* (1767), *The Resurrection* (1773), and *The Prodigal Son* (1777). He edited an edition of Handel's works in thirty-six volumes incomplete and faulty; but he is best remembered by his collection of *Cathedral Music* (1790).

ARNOLD, Samuel Greene (1821-80). An American historian. He was born at Providence, R. I., graduated at Harvard and was admitted to the bar in 1845. He was Lieutenant-Governor of his State in 1852, 1861, and 1862, and was in the United States Senate from December, 1862, to March, 1863. He published an excellent *History of Rhode Island and Providence Plantations* (1859) and several addresses, including *The Spirit of Rhode Island History* (1853).

ARNOLD, Thomas (1795-1842). An English scholar and educator, best known as master of Rugby. He was born June 13, 1795, at West Cowes, Isle of Wight, where his father was collector of customs. Upon the death of his father in 1801, Arnold was put in charge of his aunt, Miss Delafield, and remained with her for two years. At the age of eight he was sent to Warminster School in Wiltshire, whence, four years afterwards, he was sent to Winchester. From this famous school he went up to Oxford at sixteen as a scholar of Corpus Christi College, where he remained three years. Here he fell in with a small group of men, chief among whom were John Keble, the originator of the Tractarian movement and author of the *Christian Year*, and John Taylor Coleridge, afterwards judge of the Queen's Bench, by whom he was greatly influenced. He took a first in classics in 1814, and in the following year was elected fellow of Oriel College, a position which he held for the next four years. In 1815 he took the Chancellor's Prize for a Latin essay, and in 1817 the same prize for an English essay. It was during his residence at Oriel that he laid the foundation for his later work in the classics and history by wide reading along those lines, especially in Thucydides and Aristotle. Here, too, though at first reserved and shy, and later very disputatious in his maintenance of bold, if not very well-matured, opinions, he gained consideration and won distinction among the group of able men by whom he was surrounded.

He took deacon's orders in 1818, and in the following year left the University to settle at Laleham, near Staines, where he occupied himself chiefly in preparing pupils for the University, and in the pursuit of his own studies. Here he spent eight quiet years, devoting himself particularly to the study of Thucydides and Roman history, in which he was profoundly influenced by the works of Niebuhr and other German historians whose influence was very apparent in his own writings. Here, too, he began his *History of Rome*. Besides these activities he devoted much attention to problems of the Church as well as to questions affecting the lower classes, and to practical work among the poor, all of which led to the maturing of ideas on Church and social problems that brought upon him fierce attacks in later years. His political opinions, affected by his life and work here, tended to crystallize into a form of advanced liberalism, which his opponents afterwards characterized so bitterly as dangerous radicalism.

Any final estimate of Arnold must rest on his influence at Rugby. The head-mastership of Rugby fell vacant in 1827, and, though Arnold entered late in the contest and was not personally known to the electors, he was chosen for the position, largely, it would appear, on the recommendation of one of his friends, who predicted that if elected he would change the face of the public-school education throughout England. After being chosen in December, 1827, he took priestly orders and proceeded to the degrees of B.D. and D.D. He entered on his duties in August, 1828. The remaining fourteen years of his life were spent at Rugby and at Fox How in Westmoreland, an estate which he bought in 1832, and his career was that of the school to which he devoted himself. Dr. Percival, successor of Arnold in 1887-95, afterwards Bishop of Hereford, has said: "If I were called upon to express in a sentence or two my feeling in regard to Dr. Arnold's influence in school life, I should describe him as a great prophet among schoolmasters, rather than an instructor or educator in the ordinary sense of the term. . . . His influence was stimulative rather than formative, the secret of his power consisting not so much in the novelty of his ideas or methods, as in his commanding and magnetic personality and the intensity and earnestness with which he impressed his views and made them—as a prophet makes his message—a part of the living forces of the time."

Arnold was not the originator of any didactic system. In general, he accepted the system which he found, and infused into it a new meaning. Thus, without doing away with 'fagging,' he tempered it into a responsible supervision by the sixth form of the forms below. He insisted upon the preëminence of classical studies, but enriched the ordinary school course of the day with mathematics, modern languages, and modern history. Above all, without its "accredited phraseology of piety," he emphasized the moral and spiritual interest. True scholarship he held to be associated with Christianity. He aimed, in the common lessons and in the weekly sermon, to mold the public opinion of the school. As the head-master of Rugby, he looked as much to the development of manly character as to the training of students. His policy, in which he was eminently successful, was to send to the universities not a number of men trained to take firsts in the schools, but rather "thoughtful, manly-minded men, conscious of duty and obligation," who were almost certain to do uniformly well whatever they undertook. One immediate result was that after the passage of the Reform Bill in 1832, Rugby men represented the best reform sentiment. His own character, his deep religious sense, his noble estimate of duty, of justice, of honesty, and of truth, were strongly impressed on the school. His great ability as an organizer and administrator of men and measures did much to work, at Rugby and elsewhere, the revolution which had been predicted.

Profoundly religious, Arnold came naturally to take part in those theological discussions which attained prominence in the early decades of the last century. He wished to conserve the faith of the Church, and also to liberalize its thought. The clergy of his time appeared to him negligent and apathetic; hence he welcomed the new life promised by the Oxford Movement, and in 1829 published his pamphlets on "The Christian Duty of Conceding the Roman Catholic Claims." But he soon perceived that for him dogma could not be the sole basis of Christianity; and when, in 1836, the party in power at Oxford sought to keep Dr. Hampden from a professorship on a charge of heresy, he wrote for the *Edinburgh Review* an article of unsparing rebuke. For many years he was misunderstood by broad and by high churchmen alike. Because of the temper of his *Christian Duty*, the Archbishop of Canterbury refused to permit him to preach Bishop Stanley's consecration sermon. His *Edinburgh* article nearly cost him his Rugby post. But by 1840, with the passing of the first shock of the religious controversies of 1830-40 and with the lessening of his early strenuousness, as well as by the increasing recognition of his great work as master of Rugby, much of this friction passed away and his last years were full of honors. The honor most prized by him was his appointment by Lord Melbourne to the professorship of modern history at Oxford in 1841. His enjoyment of this was, however, very short. He died suddenly June 12, 1842. His domestic relations were most happy. In 1820 he married Mary, youngest daughter of Rev. John Penrose, rector of Fledborough, Nottinghamshire, and sister of one of his school and college friends, Trevenen Penrose. The story of his relations with his family and friends forms one of the most tender and beautiful chapters in a life rich beyond that of most men in charm of personal associations. His four sons, who survived him, were Matthew; William Delafield (1828-59), director of public instruction in the Punjab and author of *Oakfield*, who is commemorated in Matthew Arnold's poem, *A Southern Night;* Thomas; and Edward Penrose (1826-78), a fellow of All Souls', Oxford, and an inspector of schools from 1866 to 1877.

Arnold endeavored to promote a better understanding between the poor and the well-to-do. He lectured before mechanics' institutes, from May to July, 1831, published the *Englishman's Register* in aid of working people, and afterward, with similar purpose, contributed a series of articles to the Sheffield *Courant*. Some of the *Register* and *Courant* papers were reprinted by Stanley in a volume of *Miscellaneous Works* (1845). He was also a member of the senate of the University of London from 1836 to 1838, when he resigned because of disagreement with the majority of the members as to the requirements for degrees in Arts.

As a classical scholar, Arnold was deficient in the elegances of the Eighteenth-Century tradition. Regardless of style, he viewed even the history of Livy with dislike. In the class-room his scholarship was most manifest in extemporaneous renderings. That he was well versed in the wider reaches of philological principle is shown by his three-volume edition of Thucydides (1830-35; 2d ed., 1840-42); although it is to be admitted that the value of that work lies chiefly in its exposition of those ideas respecting the essential continuity of history which, voiced in Arnold's Oxford inaugural, afterward determined the philosophy of Freeman. Dr. Arnold's literary fame rests finally upon his *History of Rome* (Vols. I.-III., 1838-42), which, as projected, was to terminate in the coronation of Charlemagne, but was not brought beyond the close of the Second Punic War. The history was based on the epochal *Römische Geschichte* (3 vols., 1811-22) of Niebuhr. It is probably agreed that the representative portion of the work is that which offers what Archdeacon Hare has termed the first "adequate representation of the wonderful genius and noble character of Hannibal" (Stanley, ch. iv.). Free from partisanship or paradox, dignified without being wearisome, the history is notable both for its finished style and its sound and extensive learning. That it attends closely upon the *ipse dixit* of the German authority has been regretted by many. His other works include a volume of lectures on the *Study of History* delivered at Oxford, six volumes of sermons, besides traveling journals and miscellany. His chief claim to remembrance must rest on his noble life and character. "His *Thucydides*, his history, his sermons, his miscellaneous writings, are all proofs of his ability and goodness. Yet the story of his life is worth them all." (See the lines of his son, Matthew Arnold, in *Rugby Chapel*).

Consult: A. P. Stanley, *The Life and Correspondence of Thomas Arnold, D.D.* (Boston, 1860), the authoritative work on Arnold, and one of the classics of English biography; Hughes, *Tom Brown's School Days* (London, 1857); Worboise, *Life of Dr. Thomas Arnold* (London, 1859); Fitch, *Thomas and Matthew Arnold and Their Influence on English Education*, "Great Educators Series" (New York, 1897); also, in German, Zinzow (Stettin, 1869) and Wittig (Hanover, 1884).

ARNOLD, Thomas (1823-1900). An English scholar. He was the son of Dr. Thomas Arnold of Rugby, brother of Matthew Arnold, and father of Mrs. Humphry Ward, the novelist. He was educated at Rugby and Oxford, taking his degree in 1845, and became a colonial school inspector in Tasmania. He embraced Roman Catholicism in 1856 and joined John Henry Newman at Dublin. He became professor in the Roman Catholic university there, and followed Newman to the Oratory at Birmingham. In 1865 Dr. Arnold temporarily abandoned the Catholic Church, and removed to Oxford, being a lecturer and examiner there and at the Royal University of Ireland. After the death of his wife in 1888 he was more closely associated with Cardinal Newman. He published a *Manual of English Literature*, which has been widely used; edited old English texts, including Wyclif and Beowulf, and with the Rev. William Addis, the *Catholic Dictionary*. A few months before his death he published *Passages in a Wandering Life*, containing much of interest concerning Cardinal Newman and other friends famous in the Tractarian Movement.

ARNOLD, Thomas Kerchever (1800-53). An English clergyman and author. He was born at Stamford, graduated in 1821 at Trinity College, Cambridge, and in 1830 was appointed rector of Lyndon, Rutlandshire. He edited at different times the *Churchman's Quarterly Magazine*, the *Churchman's Monthly Companion*, and the *Theological Critic;* and published theological pamphlets and treatises, *Short Helps to Daily Devotion* (1847), and two volumes of sermons (Vol. I., 1845; Vol. II., posthumously, 1858). His reputation chiefly rests, however, on his large list of school-books, including particularly an *English-Latin Lexicon* (with Rev. J. E. Riddle, 1847), based on a similar German work by C. E. Georges, and a *Practical Introduction to Greek Prose Composition* (1838), and a *Latin Prose Composition* (1839), both of which have in England been highly valued and have passed through numerous editions.

ARNOLD, är′nôlt, Yuriy von (1811-98). A Russian composer. He was born at Saint Petersburg, was an army officer from 1831 to 1838, and subsequently a member of the civil service. In 1859 he won the prize of the Saint Petersburg Philharmonic Society for the best ballad with his *Svyetlana*. Subsequently he lectured on musical topics at Moscow and Saint Petersburg, was a musical critic on the *Signale* at Leipzig from 1863 to 1868, and was appointed professor of vocal music in the Moscow Conservatory in 1870. His works include, besides the above-mentioned, an opera entitled *The Gypsy*, an *Overture to Boris Godunoff*, and many songs. In 1888 he became professor of the history of musical art at the Moscow University. His most important contributions to the literature of music are: a *Theory of the Ancient Russian Church* *and Folk-Singing;* and *Is It Possible in Musical Art to Establish a Characteristically National School of Singing, and on What Data Must It Be Based?* published in the *Bayan* (Saint Petersburg, 1888-89).

ARNOLDI, är-nōl′dē, ERNST WILHELM (1778-1841). A German manufacturer and financier. He was born at Gotha, established a dye-works there and an earthenware manufactory at Elgersburg, and did much to encourage export trade. He was the chief promoter of the so-called Mercantile Institute of Gotha (1817), founded the Mutual Fire-Insurance Bank at Gotha (1821), and the Mutual Life-Insurance Bank, the first institution of the sort in Germany (1829). The beet-sugar industry was greatly extended by him. For his biography, consult Hopf (Gotha, 1878) and Emminghaus (Weimar, 1878).

ARNOLDI, WILHELM (1798-1864). A bishop of Treves. He was born at Badem, Prussia, studied at the seminary of Treves, and was appointed pastor and capitulary of the cathedral church there in 1834. In 1839 he was elected bishop, but in consequence of governmental opposition was not enthroned until 1842. It was his exhibition of the Holy Coat which, through the attacks of Ronge, gave the first impetus to the German-Catholic movement. He did much to promote Church art, and in matters of Church policy was a firm ultramontanist. For his biography, consult Kraft, *Wilhelm Arnoldi, Bischof von Trier* (Treves, 1865).

AR′NOLD OF BRESCIA, brĕsh′ȧ (c.1100-55). An Italian cleric, born at Brescia, celebrated in connection with the movement for ecclesiastical reform in the Twelfth Century. He studied at Paris under Abélard (q.v.), and attempted to apply the philosophical teachings of the latter to political conditions. Arnold of Brescia was possessed with the idea that he was destined to reform his age, and argued that the Church must revert to its apostolic poverty in order again to be virtuous. On returning to Brescia, he preached vigorously that the Church ought neither to own property nor to exercise temporal power. By his preaching the people of Brescia were exasperated against their bishop, and the revolutionary spirit spread widely. Consequently, Arnold was cited before the second Lateran Council, in 1139, and banished from Italy. He retired to France, but, experiencing the bitter hostility of Saint Bernard, who denounced him as an enemy to the Church, he took refuge in Switzerland. There he remained for about five years. In the meantime the people at Rome revolted, in 1143, against the Papal rule and established a commune. Arnold proceeded thither and soon became leader of the populace. For ten years the city was in a state of disorder. Pope Lucius II. was killed in the insurrection of 1145, and Eugenius III. was obliged to flee from the city. These commotions were subdued by Adrian IV., who, feeling the weakness of his temporal authority, made use of the spiritual, and resorted to the extreme measure of laying the city under an interdict. The revolutionary party became discouraged and disintegrated. Arnold was obliged to take refuge with friends in Campania. On the arrival of the Emperor Frederick I., in 1155, Arnold was arrested and brought to Rome, hanged, his body burned, and the ashes thrown into the Tiber. Consult: Gregorovius, *History of the City of Rome in the Middle Ages* (London, 1894); Castro, *Arnoldo da Brescia e la rivoluzione del XII. secolo* (Leghorn, 1875).

ARNOLD OF WINKELRIED. See WINKELRIED.

AR′NOLDSON (FISCHOF) SIGRID (1869-—). A Swedish opera-singer. She was born at Stockholm, studied under Madame Artôt in Berlin and Maurice Strakosch in Paris, and made her first appearance at Moscow, Russia, as Rosina, in *Il Barbiere di Siviglia.* She has a finely cultivated soprano voice of extensive range, and has been very successful as Mignon, Rosina, and Carmen. She sings regularly in the Italian opera at Saint Petersburg, and was a member of the Metropolitan Opera House troupe in New York City during the season of 1893-94.

ARNOLD VON LÜBECK, är′nōlt fōn lụ′bĕk (?-1212). A German abbot and chronicler of the Middle Ages. He was abbot of the cloister of Saint John at Lübeck, and continued the *Slavic Chronicle* of Helmold from 1170 to 1209. This continuation may be found in the *Monumenta Germaniæ Historica*, Volume XXI.; or, translated by Laurent, in the *Geschichtschreiber der deutschen Vorzeit* (1853, 2d ed., 1896). Consult Damus, *Die Slawenchronik Arnolds von Lübeck* (Lübeck, 1873).

ARNOLFO DI CAMBIO, är-nōl′fō dē käm′-byō (c.1232-1302). The most notable Florentine architect of the Gothic period, born at Colle, Tuscany. He was also a sculptor. Like most other prominent Florentine artists of his generation, he was a pupil of Niccola Pisano (in 1266), but also came under the influence of the Roman school, as is shown by his monument of Cardinal De Braye at Orvieto, and by several similar monuments and ciboriums in Rome. His earliest known architectural masterpiece is the colossal Church of Santa Croce, in Florence (begun in 1294), which shows that he excelled rather in conception and construction than in the elaboration of details. When the Cathedral of Florence was rebuilt (1296), its construction was confided to him, but his death led to a change of plan. The famous Palazzo Vecchio there has been attributed to him, probably wrongly.

ARNOLPHE, är′nōlf′. A character in Molière's *Ecole des femmes.* He believes that all women of the world will make inconstant wives, and thus tells a friend, in the first act of the play, that he has been rearing a spouse for himself in the seclusion of the country—a peasant's daughter, Agnes by name. The succeeding action of the play shows that Arnolphe's theory is more sound than the preventive is efficacious.

AR′NON. A river issuing into the Dead Sea, the modern Wady Mojib. The main stream is only 13 miles long. The banks are lined with limestone and basalt rocks, some reaching the height of 1700 feet. The Arnon once formed the boundary line between Reuben and Moab. It is referred to in the Mesha inscription, and its fords are mentioned in Isa. xvi. 2.

AR′NOT, WILLIAM (1808-75). A Scotch clergyman. He was born in Scone, was educated at Glasgow, was appointed pastor there in 1838, and at Edinburgh in 1863. He joined the Free Church Movement (1843), and in 1873 was a delegate to the meeting of the Evangelical Alliance at New York. His works have been much read, and include *Illustrations of the Book of Proverbs* (1869) and *The Parables of Our Lord* (1870). Consult *Autobiography and Memoir* (London, 1877).

AR'NOTT, Neil (1788-1874). A Scotch physician and physicist. He was born at Arbroath, Scotland, and was educated at the Grammar School of Aberdeen and at Marischal College, in the same city. After studying medicine at Aberdeen, he went to London in 1806 and soon entered the East India Company's service in China. In 1811 he returned to London and engaged in general practice. In 1836 Dr. Arnott participated in the foundation of the University of London and was appointed a member of its senate. He was afterward elected a fellow of the Royal Society and of the Geological Society. In 1837 he was appointed a physician extraordinary to the Queen. In 1823-24 Dr. Arnott was induced to deliver a course of lectures at the Philomathic Institute on natural philosophy in its applications to medicine. The substance of these lectures formed the basis of his *Elements of Physics, or Natural Philosophy, General and Medical,* published in 1827. Among the numerous applications of physical science to medical practice and to the alleviation of human suffering in general, invented by Dr. Arnott, may be mentioned the water-bed; but it is in connection with improvements in the warming and ventilating of houses that the name of Dr. Arnott was best known. In 1838 he published a treatise on *Warming and Ventilating,* and in 1855 another on *The Smokeless Fireplace, Chimney-valves,* etc. He was the inventor of the 'Arnott Stove' and 'Arnott Ventilator,' which, with characteristic philanthropy and disinterestedness, he did not patent, but for which he received the Rumford Medal of the Royal Society in 1854. In 1861 he published *A Survey of Human Progress,* full of interesting and enlightened views on improvement generally. In 1864 appeared Part I. of the revision of the *Physics;* this was followed by Part II., which contained the subjects of optics and astronomy for the first time, and also an interesting supplement entitled *Arithmetic Simplified.* Arnott's last publication was a small work on national education. He was a liberal benefactor to the University of London and the various Scottish universities. For memorial notice, consult *Proceedings of the Royal Society,* Vol. XXV. (London, 1877).

ARNOT'TO (probably the native name), or **ANNATTO** (also called Arnatto and Annotta; Ger., *Orleans;* French, *rocou*). A coloring matter of vegetable origin used to some extent in dyeing and calico-printing; it is also used as a coloring ingredient in plasters, ointments, and in certain varnishes; farmers use it for coloring butter and cheese. It is made from the seed pellicle of an evergreen plant, the *Bixa Orellana,* growing in Brazil, Cayenne, and several other places. To obtain it, the seeds of the fruit capsules are crushed and allowed to ferment in water; they are next rubbed upon a sieve, completely mashed, and the coloring matter washed away; after some time the water is decanted, and the coloring matter allowed to dry in the shade. It is then broken up into cakes and wrapped in leaves. Urine is sometimes used to keep it from decomposing. Arnotto is insoluble in water; it dissolves with a red color in alcohol, in alkalies, and in fixed oils. It gives beautiful but fugitive shades; its employment in dyeing and calico-printing is therefore limited. Indians prepare from it a paint for the body, used partly for the purpose of protecting themselves against mosquito bites; in South America it is largely used to improve the color and flavor of chocolate. The chief coloring principle of arnotto is a crystalline yellow substance called *bixin.*

ARNOULD, är'nōō' Sophie (1744-1803). A celebrated French actress and singer. She was born at Paris in the same room in the Rue de Bethisy in which Admiral Coligny was murdered. She made her début at the Grand Opera, December 15, 1757, with splendid success. During a period of twenty-one years (1757-78) she was the most prominent and popular singer at the Royal Opera at Paris, one of her rôles being Iphigenia, in Gluck's *Iphigenia in Aulis,* which she was the first to interpret. Her voice was sweet and effective, her interpretation true to the intentions of the composer, her acting vivacious and graceful. She was not less remarkable for beauty and wit, and her home was frequented by such eminent scholars as d'Alembert, Helvetius, Diderot, and Rousseau. She has frequently been compared with Ninon de l'Enclos, and many of her epigrams and witticisms have been collected under the title of *Arnouldiana.*

ARNOULD-PLESSY, är'nōō'ple-sê', Jeanne (1819-97). A French actress. She was born at Metz, and made her début at the Comédie Française as Emma in *La fille d'honneur.* Afterward she took prominent parts in *La passion secrète, Le verre d'eau, Julie,* and in many other successful plays. In 1845 she suddenly severed her contract and went to London, where she married J. F. Arnould, the dramatic author. Condemned by the French courts in the following year to pay damages to the amount of 100,000 francs (about $20,000), she went to Saint Petersburg in 1846, where for nine years she was engaged at the Théâtre Français. She returned to Paris in 1855, and was again a member of the Comédie Française until 1876, her principal triumphs here being associated with the later dramas of Emile Augier. During her long histrionic career she is said to have created fifty-three distinct rôles.

ARNPRI'OR. A town of Renfrew County, Ontario, Canada, on Chats Lake, at the junction of the Ottawa and Madawaska rivers, 38 miles northwest by rail from Ottawa. It has stations on the Canadian Pacific and the Canada Atlantic railways, several mills, marble quarries, and neighboring iron mines. The United States is represented by a consular agent. Population, in 1891, 3341; in 1901, 4152.

ARNSBERG, ärns'bĕrk. The capital of the government district of the same name in the Prussian Province of Westphalia, on the Ruhr, about 44 miles southeast of Münster (Map: Prussia, C 3). It has several churches, a gymnasium, a municipal hospital, a public slaughter-house, water-works, and gas-plant, and is the seat of the district government. Its principal article of manufacture is paper. On a hill above the town stand the ruins of the ancient castle of the Counts of Arnsberg. Near the castle is pointed out the spot where the chief tribunal of the Vehmgerichte (q.v.) was held. Population, in 1895, 7786; in 1900, 8448.

ARNSTADT, ärn′stät. The capital of the German principality of Schwarzburg-Sondershausen, situated in a picturesque country on the banks of the Gera, 12 miles south of Erfurt (Map: Germany, D 3). Among its noteworthy buildings are a castle, containing a picture gallery and valuable porcelain collection, the Rathhaus, and the newly restored Liebfrauenkirche, with a richly decorated portal. Arnstadt possesses numerous schools and a municipal hospital. Formerly it was the chief emporium for the trade in fruit and timber between the fertile lowlands and the Thuringian Forest region, and is still an important market for grain. It is also a manufacturing town, employing a very considerable number of hands in weaving, shoe and glove making, brewing, the manufacture of pottery, etc. Deposits of rock salt and brine baths in that neighborhood have made Arnstadt an important watering-place. The composer, J. S. Bach, was for several years organist at the Church of Saint Boniface. Population, in 1890, 12,800; in 1900, 14,413. Arnstadt is one of the oldest of Thuringian cities, its existence being traceable as far back as A.D. 704.

AR′NULF (850-899). King of Germany and Roman Emperor. He was a natural son of the East Frankish king, Carloman, who was a great-grandson of Charles the Great. In 887 he led the revolt which forced Charles the Fat to abdicate, and was elected King of the East Franks—i.e. of Germany. In 891, in the battle of Louvain, on the Dyle, he exterminated the Northmen who were invading his kingdom. He invaded Italy in 894, was crowned Emperor in 896, and died in 899.

ARNULF, Saint (c.582-641). An ancestor of the Carlovingian emperors, who derived their name, Arnulfinger, from him. He was Bishop of Metz from about 612 to 627, when he resigned his position and retired to a hermitage in the Vosges Mountains. His body was afterward buried in the famous church bearing his name at Metz.

AROER, ăr′ô-ẽr *or* ȧ-rō′ẽr. A city on the banks of the Arnon, mentioned in Deut. ii. 36 and iii. 12 as the southern limit of Reuben's territory. According to the Mesha inscription it belonged to Moab. It is no doubt the modern 'Ara-îr, on the Wady Mojib, 11 miles from the Dead Sea.

AROKSZALLAS, ŏr′ŏk-säl′äsh. A town of Hungary, about 44 miles northeast of Budapest. It contains a fine church, and carries on a considerable trade in grain. Population, in 1890, 11,190.

AROLAS, ȧ-rō′lȧs Juan de (1805-49). A Spanish poet. He was born at Barcelona, was a member of the Piarist Order, and was appointed an instructor in the school of the Order at Valencia. His collected poems, which first appeared in three volumes in 1860, were last published in 1890 as the forty-third volume of the *Biblioteca selecta* (Valencia, 1840 et seq.).

AROLSEN, ä′rôl-*sen*. The capital of the German Principality of Waldeck, on the Aar, about 22 miles west northwest of Cassel (Map: Germany, C 3). The castle contains a valuable library, a picture gallery, a fine collection of engravings and antiquities. The town is the birthplace of the sculptor Rauch, and of the painters Wilhelm and Friedrich Kaulbach. Population, in 1895, 2768; in 1900, 2734.

ARO′MA (Lat., Gk. *ἄρωμα*, *arōma*, spice, sweet herb). A term employed to designate a spicy or a pleasantly pungent odor. Thus we speak of the aroma of roast meat and of the aroma, or *aromatic* smell, of hyssop, mint, and other plants. Aromatic smells are very characteristic of some natural orders of plants, as *Labiatæ* (mint, etc.) and *Compositæ* (milfoil, etc.). They depend largely on the presence of volatile oils. See Nose: Smell; Aromatics.

AROMATARI, ä′rō-mä-tä′rē, Giuseppe degli (1586-1660). An Italian physician and naturalist, born at Assisi. He studied at Montpellier and Padua, and practiced for many years at Venice. He became widely known and declined flattering invitations from the Duke of Mantua, Pope Urban VIII., and King James I. of England. His "De Generatione Plantarum in Seminibus," a letter addressed to Nanti, and first published as part of the volume, *Disputatio de Rabie Contagiosa* (1625), was once very famous.

AR′OMAT′ICS (Gk. *ἀρωματικός*, *arōmatikos*, aromatic). A class of medicines which owe their efficacy to oils obtained from them by distillation, and called volatile, distilled, or essential oils. They are characterized by emitting an agreeable, aromatic odor and usually have a warm, pungent, spicy taste. Aromatics include also certain other drugs and some animal substances. Among the families which yield the most important aromatics are the Labiatæ, Umbelliferæ, Lauraceæ, Myrtaceæ, Aurantiaceæ, Coniferæ, Scitamineæ, Orchideæ, etc. In some cases, the aromatic matter is diffused throughout all parts of the plant, but it is usually condensed in particular organs, such as the root, in the case of ginger; or the bark, in the case of cinnamon, canella, and cascarilla; or the flowers, as in the case of cloves; or the fruit, as in the case of anise and vanilla; or the wood, as in the case of sandal-wood and aloes-wood; or the leaves, as in the case of most of the Labiatæ, Umbelliferæ, etc.

Aromatics may be arranged in the following sub-classes: (1) Those in which the active principle is an essential oil, as the oil of thyme, lavender, cajeput, neroli, fennel, etc. (2) Those containing camphor, or an allied body, such as artificial camphor obtained from turpentine. (3) Bitter aromatics, in which there is a mixture of a bitter principle and an essential oil, as chamomile, tansy, wormwood, etc. These are tonics and vermifuges. (4) Those of which musk is the type, such as civet and amber; and certain plants with a musklike odor, such as *Malva moschata*, *Mimulus moschatus*, and *Hibiscus abelmoschus*. (5) Those containing a fragrant resin, as benzoin, myrrh, olibanum, storax, and the balsams of Peru and Tolu, which possess stimulant properties.

As a general rule, these substances act as diffusible stimulants of more or less power, and as antispasmodics, while those in which a bitter principle is present act as vermifuges or tonics. They are also employed internally to disguise the taste of other drugs. Locally they are used as counter-irritants, local anæsthetics, and antiseptics.

ARONA, ȧ-rō′nȧ. A town in north Italy 42 miles northwest of Milan, near the southern end of Lake Maggiore. Steamers connect it in summer with Locarno in Switzerland. It has silk, cotton, and metal works, and is commercially very active. A noteworthy feature of the town is a brazen statue, 70 feet high, erected in 1697 to the memory of Cardinal Carlo Borromeo (q.v.), who was born here in 1538. Population, in 1881, 4182; in 1901, 4700.

ARON′IA. See Cratægus.

AROOSTOOK, ȧ-rōōs′tụk. A river rising in Piscataquis County, northern Maine, 1050 feet above the sea, flowing northeast through Aroostook County, and entering the Saint John's River, in New Brunswick (Map: Maine, H 2). It is the chief tributary of the Saint John's River, and along its valley lies some of the richest soil in the State. It is about 125 miles long, and drains an area of 2550 square miles, of which 2500 are in Maine. It falls 705 feet from its source to the State line, a distance of 117 miles, thus affording extensive water power. It possesses historical interest from its connection with the long-agitated question of the northeastern boundary between British America and the United States.

AROOSTOOK, Lady of the. The title of a novel of W. D. Howells. The heroine of it takes passage across the Atlantic on a trading vessel, the *Aroostook*, no other woman being on board. The book is among the best of Howells's earlier period.

AROUET, ȧ′rōō′ā′. See Voltaire.

ARPACHSHAD, är-păk′shăd. In the list of eponyms of the nations in Gen. x., Arpachshad appears as the third son of Shem, ancestor of the Tershites, and consequently of the Hebrews. The name is supposed by many scholars to represent Arrapachitia, a region on the Upper Zab, northeast of Nineveh. Since the absence of Babylonia causes some surprise, Cheyne suggests that the original had two words, Arpach-Arrapachitis and Chesed-Chaldæa, while Hommel explains it as Ur-pa-keshad, an Egyptian variant of Ur-kasdim. More probable is Jensen's explanation that the word was originally Arba-kishadu, meaning "the four banks," a designation of Babylonia, as including the territory from the eastern bank of the Tigris to the western bank of the Euphrates.

AR′PAD (Assyrian *ar-pad-da*). An ancient city of Syria, the site of which is 13 miles northwest of Aleppo. In B.C. 740 it fell into the hands of Tiglath Pileser II. It is mentioned in Isa. x. 9. The modern Tel Erfad represents its locality.

ARPAD (? -907). The national hero of Hungary. He was the son of Almos, the leader under whom the Magyars first gained a footing in Hungary, and was chosen duke on his father's death, in 889. By incessant and, for the most part, successful warfare with the Bulgarians and Moravians he extended the conquests of the Magyars on all sides. He also made incursions into Italy about 900, and returned laden with booty. He died in 907, leaving his son in possession of the supreme command. The first crowned king of the house of Arpád was Saint Stephen, who ascended the throne in 997. The Arpád dynasty became extinct in the male line with Andreas III., in 1301. Arpád lives in the popular songs of the country; his history, even in the oldest chronicles, is mixed up with the national legends.

ARPEGGIO, är-pĕj′-ō (It., harping, from *arpa*, harp). In music, a chord of which the notes are sounded not contemporaneously, but in succession, in a broken manner, as on a harp. Bass chords thus treated form *Alberti bass*, so named from Domenico Alberti (1707-40), a popular singer and player, who often played the bass in this style.

AR′PENT, *Fr. pron.* ar′paɴ′. The old French land measure, corresponding to our acre. The word is derived from *arepennis*, *arapennis*, the Latin form of the name of a Gallic land measure. It was identified by Columella with the Roman *actus*, or half *iugerum*. Ordinarily, an arpent may be reckoned as five-sixths of an acre.

ARPINO, är-pē′nō (anciently, Lat. *Arpinum*). A town of south Italy, 14 miles north of Roccasecca, and 94 miles northwest of Naples, near the river Garigliano (ancient Liris) (Map: Italy, H 6). It is celebrated as the birthplace of Marius, Cicero, and Vipsanius Agrippa. Near Arpino are a Trappist convent, called Casamari, and a bridge called Ponte di Cicerone. The public school bears the name Collegio Tulliano, and the local theatre is Teatro Tulliano. The local cloth manufacturers proudly proclaim that in the time of the Roman Republic, Arpinum was famous for woolens, and that the father of the immortal orator was superintendent of a fulling mill. Arpino also manufactures parchment, paper, and leather, and quarries excellent marble. Population, in 1881, about 5000 (commune, 11,368); in 1900 (commune), 10,607. Consult Kelsall, *Classical Excursion to Arpino* (Geneva, 1820).

ARQUA, är-kwä′. A village in north Italy 12 miles southwest of Padua. Here Petrarch lived and died. His house has faded frescoes of scenes from his poems, and a few souvenirs, and his sarcophagus rests on red marble columns in front of the church. Population, about 500.

ARQUEBUS, är′kwē-bŭs, or **HARQUEBUS,** (Fr. *arquebuse*, OF. *harquebuse*, from Dutch *haakbus*, from *haak*, hook + *bus*, gunbarrel; cf. Eng. *hagbut*, and Ger. *Hakenbüchse*, a gun with a hook). The first form of a gun, resembling the modern musket. Hand-guns are mentioned as early as 1414, but not until the second half of the Fifteenth Century do we find illustrations of the same. The arquebus at this period consisted of a metal tube, fixed in a straight stock of wood, with a vent at the top of the barrel, where the match was applied. Some time between the close of the Fifteenth Century and the middle of the Sixteenth Century the lock was added. Two kinds of locks are noteworthy: the first moved toward the gunner when the trigger was pressed; the second, like the modern lock, receded. It was not until the middle of the Sixteenth Century that firearms became important in warfare. The arquebus of the period is of two principal kinds, fired with a rest or without one. In 1567 the arquebus was used by the Duke of Alva against the Flemings, and in 1573 Charles IX. introduced it into the French army. The arquebusiers were both footmen and cavalry, and in England many yeomen of the guard became arquebusiers. By the middle of the Seventeenth Century the arquebus was either breech-loading or muzzle-loading; the length of the barrel was about 2½ feet.

ARQUES, ärk. A French village in the Department of Seine-Inférieure, which contains the remains of an old castle built by William the Conqueror's uncle. Here Henry IV. defeated the Duke of Mayenne, 1589.

ARRACACHA, är′rȧ-kä′chȧ (Sp., from native name). A plant, *Arracacia xanthorrhiza*, of the natural order Umbelliferæ, a native of the elevated table-lands in the neighborhood of the cities of Bogotá, Colombia, and Carácas, Venezuela, and of regions of similar climate in other parts of tropical South America. It is much cultivated in its native country for its roots, which are used as an esculent. The roots divide into a number of parts, which resemble cows' horns or large carrots. When boiled they are firm and tender, with a flavor not so strong as that of a parsnip. The plant is much like hemlock, and has a similar heavy smell. Humboldt referred it to the genus Conium (Hemlock), but it has since been made the type of a new genus. The flowers are in compound umbels, and are of a dull purple color. The arracacha was at one time very strongly recommended as a substitute for potatoes. It was introduced into Great Britain through the exertions of the Royal Horticultural Society, and its cultivation perseveringly attempted; but it has been found unsuitable to the climate of England and of other parts of Europe, where it has been tried, perishing on the approach of the frosts of winter without having perfected its roots. The dry weather of summer is also unfavorable to it. It seems to require a very regular temperature and constant moisture. There are probably some parts of the British and other colonies in which the arracacha might be found a very valuable plant. In deep, loose soils it yields a great produce. It is generally propagated by offshoots from the crown of the root. By rasping the root and washing, a starch similar to arrowroot is obtained. There is another species of the same genus, *Arracacia moschata*, a native of the same regions, the root of which is inedible.

AR′RACK (Ar. *'araq*, sweat, juice, spirituous liquor, from *'araqa*, to sweat), Rack, or Raki. A term applied to Oriental distilled liquors, especially to that distilled from fermented rice and the fermented sap (toddy) of the cocoanut tree. Other products used in making arrack are rice and sugar, or rice and molasses, fermented from cocoanut juice, and from berries, dates, figs, or grapes. It is usually a colorless liquid with an agreeable taste. It improves with age and is not unwholesome. The best varieties are from Batavia, Java, where the materials used are as follows: Rice, 35 parts; molasses, 62 parts; toddy, 3 parts, the yield of pure arrack being 23½ parts. Excellent qualities are made in Madras, China, and Siam. The intoxicating power of arrack is sometimes increased by the addition of hemp, poppy leaves, and the juice of stramonium. Arrack is now made commercially in Germany and Holland. *Saki* is the local name given to the Japanese variety of arrack.

ARRAG′ONITE. Same as Aragonite (q.v.).

AR′RAH. A town and railway station in the district of Shahabad in the Presidency of Bengal, India, in latitude 25° 31′ N., and longitude 84° 43′ E., 33 miles west of Patna. It is situated in a fertile country, and contains a population of 47,000. The various incidents in its history, connected with the Mutiny of 1857, constitute its chief claim to notice. The most thrilling was the siege sustained by 12 Englishmen and 50 faithful Sikhs against a force of 3000 Sepoys until delivered.

ARRAH NA POGUE, är′rȧ nä pōg. A play by Dion Boucicault, and, next to *The Shaughraun* and *London Assurance*, probably his best; first played in 1865.

ARRAIGN′MENT (from OF. *aranier*, *araisnier*, Fr. *arraisonner*, Low Lat. *arrationare*, to call to court, from Lat. *ad*, to + *ratio*, reason, account). A proceeding in a criminal case preliminary to the trial of the accused. Its characteristic features are: (1) Calling the prisoner to the bar of the court by his name. (2) Reading the indictment to him, or furnishing him with a copy. (3) Asking him whether he pleads guilty or not guilty thereto. If the indictment is for a felony the personal presence of the criminal is necessary to a valid arraignment at common law (changed in some States by statute); but in case of a misdemeanor he may appear by counsel. Having been arraigned, the accused may obtain from the court time in which to answer the indictment; or he may move to set aside the indictment, or he may demur or plead thereto. See Demurrer; Trial; Pleading, and the works there referred to.

ARRAIGNMENT OF PAR′IS, The. A piece by George Peele (q.v.), half pageant, half masque, played before the Queen, who is herself impersonated in it as Diana, in 1581, by the chapel children. The plot, so far as there is one, is based on the legendary trial of Paris by Diana for error in judgment in giving the apple to Venus. A personage called Colin in this play is thought to stand for Spenser, and to have caused the subsequent writing of that poet's *Colin Clout's Come Home Again*, as a retort to Peele, who there figures, perhaps, as Palin.

ARRAN, ăr′an. An island in the Firth of Clyde, and County of Bute, Scotland, 5 miles southwest of Bute, separated from Kintyre by the Kilbrannan Sound (Map: Scotland, C 4). It is of oblong shape, 20 miles long, from 10 to 11 miles wide, with an area of 165 square miles. The surface is mountainous, in the north reaching an altitude of 2866 feet above the sea, and is traversed by small streams and lochs. Arran is remarkable geologically. It has quarries of limestone and coal, and some of the mountains contain jasper, agates, and rock-crystal. Only a small part of the area is under cultivation, the most important industries being cattle-raising and herring fishery. There are two excellent harbors on the east side, Brodick and Lamlash, the latter sheltered by Holy Island. Off the southern coast lies the small island of Pladda, with a lighthouse. Numerous prehistoric and Danish relics exist, and the names of some of the caves bear evidence of Robert Bruce's sojourn. The greater part of Arran belongs to the Duke of Hamilton, whose seat is Brodick Castle. The population of the island is constantly declining, having been 5234 in 1871 and 4824 in 1891. Consult *A May Week in Arran* (Edinburgh, 1882).

ARRANG′ING (Fr. *arranger*, to put into rank, order, from *à*, Lat. *ad*, to + *rang*, rank, order). In music the working over of a composition for performance by musical agencies other than those originally designated by the composer. Thus, orchestral works, as, e.g. symphonies or overtures, are arranged for the piano, or compositions written for the piano for four hands are arranged for one piano; vocal compositions, as, e.g. operas, or songs, may be arranged for some instrument, usually for the piano. When the arrangement is not a mere mechanical transcription of the notes written by the composer, but implies some creative work of the arranger, inspired by the original music, then it bears various names, as, e.g. *pot-pourri* (q.v.), or *fantasia* (q.v.). Liszt (q.v.) was one of the most famous of arrangers.

ARRAS, är′rás′ (from *Atrebates*, Latin name of a Gallic tribe). A fortified town, capital of the Department of Pas-de-Calais, in France (Map: France, J 1), and formerly capital of the county of Artois (q.v.). It is situated on the banks of the Scarpe, partly on an eminence, and partly on a plain, and consists of four divisions—the city, upper town, lower town, and citadel. It is a principal station on the French Northern Railway, distant from Paris by this route 134 miles, and from Brussels 97 miles. The houses are of hewn stone, and in the lower town they are handsomely built and uniform; the streets are straight and wide, set off with several fine squares and many beautiful public buildings. Among the principal edifices are the Cathedral of Notre Dame, built in a composite Italian style, between 1755 and 1833; the residence of the prefect, the town-hall, the theatre, and the public library, which contains 40,360 printed and 1231 manuscript books. Arras ranks as a fortified town of the third class, its fortifications being the first that were constructed by the celebrated Vauban, according to his own system. It has been the seat of a bishop since A.D. 390, and two ecclesiastical councils have been held here—one in 1025, the other in 1490. The grain market of Arras is the most important in the north of France. Its principal manufactures are beet sugar, agricultural implements, hosiery, lace, pottery, and leather. Its trade, which is considerable, is in grain and flour, oil, wine, and brandy, and the industrial products of the city. It appears from the writings of Jerome that Arras was remarkable for its woolen manufactures in his time; and afterwards, during the Middle Ages, it was famed for its tapestry: indeed, the name of the town was transferred to this article of manufacture, and *arras* was the name given in England to any richly figured hangings. Population, in 1896, 20,599. In 1482 Arras, with Artois, was ceded by the States of the Netherlands to Louis XI. of France; but the inhabitants having revolted, the King laid siege to the town, stormed it, and slew or expelled the people, whom he replaced by others brought from all parts of his dominions, ordering the city to be thenceforward called *Franchise*, to obliterate the very name of Arras. Soon afterwards (1493) it was ceded to Maximilian of Austria, and was retained by the Spanish branch of the house of Hapsburg till 1640, when Louis XIII. of France took it after a long siege. By the Treaty of the Pyrenees it was finally ceded to France. Arras suffered much in the time of the first French Revolution, especially in the year 1793. Robespierre and his brother were natives of the town.

AR′RAS. A name for large tapestries used as wall-hangings. They appear to have been first made in large numbers at Arras, in Flanders; hence their name, which in Italian is *arazzi*. It preserved this name even after Arras ceased to be the great centre of their manufacture, in the Fifteenth Century. Among the most famous single series is that for which Raphael made designs.

ARRATE Y ACOSTA, är-rä′tâ ê á-kōs′tá, José Martin Félix (1697-1766). A Cuban historian. He was born at Havana, studied law in Mexico and Havana, and was appointed alcalde of Havana in 1752. He wrote a history of Cuba, under the title *Llave del Nuevo Mundo y antemural de las Indias Occidentales*, which was not published until 1830. A new edition appeared in 1876.

ARRAWAK, är′rá-wák. See Arawak.

ARREBO, är′re-bō, Anders Christensen (1587-1637). A Danish poet, born at Aroöskjöbing. He was appointed Bishop of Drontheim, and was one of the promoters of the Renaissance poetry. He wrote some secular verse, but is best known for his *Hexaëmeron*, a description of the six days of the Creation, and a metrical translation of the Psalms of David. For his life, consult the biography by Rördam (Copenhagen, 1857).

ARREST′ (Low Lat. *arrestare*, from Lat. *ad*, to + *restare*, to stop behind). The apprehension or detention of a person by authority of law. If the seizure or restraint is unlawful, it amounts to false imprisonment. (See False Imprisonment.) At present arrest takes place more frequently in criminal than in civil proceedings. Not so formerly. (1) *Civil arrest.*—By a fiction of the common law a person who did not pay a judgment against him was deemed guilty of a breach of the peace, "subjecting his body to imprisonment," says Blackstone, "by the writ of *capias ad respondendum*." The judges who established this fiction had no bowels of compassion for the insolvent debtor. Said Justice Hyde, in 1663: "If a man is taken in execution and lies in prison for debt, neither the plaintiff, at whose suit he is arrested, nor the sheriff who took him is bound to find him meat, drink, or clothes. He must live on his own, or on the charity of others, and if no man will relieve him, let him die in the name of God, says the law, and so say I." This inhuman policy worked badly, as inhuman policies generally do; and a few years after Justice Hyde's heartless declaration, Parliament felt compelled to enter upon a course of mitigating legislation, which terminated during the last century in the abolition of imprisonment for debt, both in Britain and in this country. In some civil actions a party is still subject to arrest, either during its progress or upon its termination. As a rule these actions are of a quasi-criminal nature, e.g. to recover a fine or a penalty; or they are brought to redress wrongs to person or property done by the one arrestable. Ordinarily, a warrant of arrest in a civil suit will not justify the officer in breaking into a house to take the party; nor can it be lawfully executed on Sunday; nor are certain privileged persons, such as foreign representatives, members of Congress and Legislature in attendance upon their duties, and others liable to arrest in civil proceedings. (2) *Criminal arrest.*—Not only public officers, but private persons as well, may arrest an actual or suspected criminal. For a crime committed in his presence, or for a felony committed, although not in his presence, either a peace officer or a private person may arrest the offender without a warrant (q.v.), and a peace officer is authorized to arrest without a warrant, on reasonable suspicion that the arrested party has committed a felony. This subject is regulated by statutes in each jurisdiction, as is the mode of obtaining a warrant; and the statutes should be examined. A criminal arrest may be made on any day; a peace officer may break into a building to execute a criminal warrant, as well as call upon any person to assist him; and, as a rule, only foreign representatives, with their families and trains, are privileged from criminal arrest. Consult: Hawley, *Law of Arrest on Criminal Charges* (2d ed., Chicago, 1891); Freeman, *A Treatise on the Law of Executions in Civil Cases* (3d ed., San Francisco, 1900); and the works mentioned under the articles referred to above.

ARREST, är-rĕst′, HEINRICH D'. See D'ARREST.

ARREST′ OF JUDG′MENT. In the practice of the English common-law courts, an expedient on the part of an unsuccessful defendant, after verdict rendered against him, to have the judgment stayed or arrested, on the ground that there was some error which vitiated the proceedings. If the objection succeeded it was fatal to the prosecution of the plaintiff's cause of action, there being no opportunity for amendment after trial. The severity of this rule has been somewhat modified by legislation, so that, under modern applications of the remedy, the action or prosecution may in a proper case be renewed. At the present day, in the United States as well as in England, a defendant may have the judgment against him arrested only for good and sufficient reason appearing on the record of the case, as where the pleadings are not a sufficient basis for the action, or if there be a fatal variance between the pleadings or indictment and the proof upon which the verdict was rendered. But the existence of facts *dehors* the record, as the discovery of new evidence, or a verdict reached by the jury against the weight of evidence, will not justify an arrest of judgment. In the former case the court must proceed to judgment, notwithstanding the new facts alleged to exist, and in the latter case the court can only set aside the verdict and order a retrial of the case. This is a very different result from that which attends an arrest of judgment, the effect of which is to set aside all proceedings in the case and dismiss the complaint or indictment. This relief is usually obtained upon the defendant's motion, made after verdict and before judgment, but the court has the power to grant it even if it be not demanded. Judgment once rendered is conclusive, and cannot be arrested. It may, however, under proper circumstances—as where taken by the excusable default of the defendant—be reopened by the court in which it was obtained, or its execution may, for good cause, be stayed on application to a higher court. See JUDGMENT; STAY; and the works there referred to.

ARRETIUM, är-rē′shĭ-ŭm. An ancient Etruscan city, where, in the war (B.C. 285-282) between allied Italy and Rome, the consul Metellus lost his life. Arretium had refused to join the coalition, and was being besieged, when Metellus marched to its assistance, only to be disastrously defeated before its walls. It is the modern Arezzo.

AR′RHENATHE′RUM (Gk. ἄρρην, *arrhēn*, male + ἀθήρ, *athēr*, the beard or spike of an ear of corn). A genus of grasses embracing three species allied to Holcus (see SOFT GRASS) and Avena (see OAT GRASS). The species are tall perennial grasses, with flat leaf-blades and erect panicles, which are often one-sided. *Arrhenatherum elatior*, known also as *avenaceum*, *Avena elatior*, or *Holcus avenaceus*, is a common grass in Great Britain. It is sometimes called Oat-Grass, from the resemblance to the coarser kinds of oats in the general appearance of the panicle. In France it is very much cultivated for fodder, and it is often called French Rye-Grass. It has, however, no affinity to the true rye-grass, Lolium.

ARRHENIUS, är-rā′nĭ-us. SVANTE (1859-—). A Swedish physical chemist. He was born near Upsala, and studied physical science at the university of that city. After a brief period of teaching at his *alma mater* he spent several years abroad, carrying on original investigations in collaboration with some of the best European chemists and physicists of the day, and in 1891 was made professor in the University of Stockholm. Arrhenius's researches have resulted in one of the most important among the recent contributions to science. Confining his attention almost entirely to the relations between electrolytic phenomena and the chemical and physical properties of substances, he succeeded in establishing on a firm basis a general theory, which is now all but universally accepted by the scientific world, viz., the so-called theory of electrolytic dissociation. According to this theory, a substance whose aqueous solution is capable of conducting electricity is broken up in solution into parts charged, some with positive, others with negative electricity Thus, ordinary brine contains, according to Arrhenius's theory, electro-positive 'ions' of the metal sodium, and, separated from them, electro-negative ions of chlorine. The theory reminds one of the old dualistic view of the nature of chemical composition, advanced by Davy and Berzelius in the first part of the Nineteenth Century: and, in the opinion of many authorities, may lead to a revival of those views in some modified form. What is certain is that the theory of electrolytic dissociation furnishes an excellent explanation of a host of chemical phenomena which would otherwise remain entirely unintelligible, and that it correlates a number of different facts, between which no connection could otherwise be detected. Arrhenius's publications include *Sur la conductibilité galvanique des électrolytes* (1884), a work (in German) on electro-chemistry (1902), and a number of original monographs contributed to the *Zeitschrift für physikalische Chemie.* See DISSOCIATION.

AR′RHIDÆ′US (Gk. Ἀρριδαῖος, *Arrhidaios*). An illegitimate son of Philip of Macedon by Philinna, a dancing girl of Larissa. He was at Babylon when Alexander died, in B.C. 323, and, though almost an imbecile, was elected king, under the name of Philip, with the understanding that if a son were born to Roxana, the widow of Alexander, he should be associated with Arrhidæus in the Government. The next year Arrhidæus married Adea, called Eurydice, the granddaughter of Perdiccas II. Two years later he and his wife were captured by Polysperchon, the leader of the cause of Alexander's son, born of Roxana, and both were put to death by the order of Olympias, the grandmother of the young king.

AR'RIA. The wife of the Roman Cæcina Pætus, who, for treason to the Emperor Claudius, was ordered to end his own life by suicide (in A.D. 42). When Pætus hesitated, she seized the dagger, drove it to the hilt into her own breast, and then handed it to him, saying calmly, "Pætus, it does not pain me!" (*"Non dolet, Pæte!"*) She fell dead, and the husband at once dispatched himself with the reeking weapon.

ARRIAGA, är'rē-ä'gȧ, PABLO JOSÉ D' (1562-1622). A Spanish Jesuit and author. He was born at Vergara, was rector of the Jesuit college at Arequipa, and subsequently the first rector of that at Lima. He wrote a valuable historical work, *Estirpación de la idolatria de los Indios del Perú.*

AR'RIA'NUS (Gk. Ἀρριανός, *Arrhianos*) (?-c.180 A.D.). A distinguished historian and a native of Nicomedia, in Bithynia. He was born near the end of the First Century A.D., of good family, and upon obtaining the Roman citizenship, assumed the name Flavius. After completing his education, he left home, and lived for some time, in the reign of Trajan, at Nicopolis, where he was a devoted pupil of the Stoic philosopher Epictetus. He won early in life the friendship of Hadrian, and was from time to time honored with marks of the Emperor's favor. While in the public service he traveled much, and became acquainted with a number of lands and peoples. In A.D. 130 he was *consul suffectus*, and soon after was made *legatus Augusti pro prætore* of the Province of Cappadocia, an office which he held for several years. It was at this time that he successfully defended the Province of Cappadocia against an invasion of the Alani. Under Antoninus Pius he obtained the consulship, and in A.D. 147-48 he appears at Athens, where he had obtained the citizenship, as Archon Eponymos. He was also at some period of his life priest of Demeter (Ceres) in his native town. During the last half of his life, he seems to have kept himself apart from public service and to have devoted himself to letters.

As a writer Arrianus was a close imitator, both in point of subject and in point of style, of Xenophon. His relation to Epictetus was, in his own regard, that of Xenophon to Socrates, and he was known at Athens as the "younger Xenophon." He wrote on philosophical, historical, and military subjects. His philosophical writings all related to Epictetus. *The Discourses of Epictetus* (Διατριβαὶ Ἐπικτήτου) in eight books, the first four of which have been preserved, comprised notes taken by Arrianus of his master's lectures, and put in form for publication. So far as possible, the original words of the master were preserved. A *Manual of Ethics* (Ἐγχειρίδιον Ἐπικτήτου), together with the commentary of Simplicius on the same, has also come down to us. *The Conversations of Epictetus* (Ὁμιλίαι Ἐπικτήτου), in twelve books, is mentioned, though this work was possibly another form of the *Discourses.* The most important historical work of Arrianus is *The Anabasis of Alexander the Great*, in seven books, which, both in the number of its books and in its style, is a reminiscence of Xenophon. The *Anabasis* not only contains the campaigns of Alexander in Asia, but is a complete narrative of the life of the King from the beginning of his reign to the time of his death. It is an impartial and accurate narrative, based on the most trustworthy authorities, and written in a plain and unadorned style. The two chief authorities used were Ptolemy, son of Lagus, and Aristobulus, both officers in Alexander's army. Besides these, the works of Eratosthenes, Megasthenes, Nearchus, and others, as well as the letters of Alexander, etc., were drawn upon. *The Indica* (Ἰνδική) is a geographical work, containing a description of India, together with an account of the voyage of Nearchus from the Indus to the Euphrates, and is written in the Ionic dialect. The sources were principally Nearchus, Eratosthenes, and Megasthenes. It was appended to the *Anabasis*, of which it may be regarded as a continuation. *The Events After Alexander*, in ten books; *The Bithyniaca*, in eight books (containing a history of Bithynia from mythical times to the abdication of the last king, Nicomedes III., in B.C. 75), and *The Parthica*, in seventeen books (containing an account of the Parthian War under Trajan), have been lost. Of *The Alanica*, a history of the Alani, only a small extract, called Ἔκταξις κατ' Ἀλανῶν, is preserved. *The Periplus of the Euxine Sea* is a description of a voyage around the Euxine Sea, undertaken by Arrianus in his official capacity as governor of Cappadocia. It was a report made to the Emperor Hadrian, and dates from A.D. 130-31. A second *Periplus of the Euxine Sea* and a *Periplus of the Red Sea*, to which the name of Arrianus is attached, are later compositions. A work on tactics, preserved, was based on a work of the same name by Ælian, which, again, was taken in its main features from Asclepiodotus's work. The *Cynegeticus* is a short treatise on hunting, written as a supplement to Xenophon's work on the same subject. Other works, not preserved, were biographies of Timoleon of Corinth and Dion of Syracuse, and a *Life of Tilliborus*, a famous robber of Asia Minor. Editions of the *Anabasis* are by Krüger (Berlin, 1848), Sintenis (Berlin, 1867), and Abicht (Leipzig, 1876). There is a translation by Chinnock (New York, 1893). The philosophical works are to be found in Schweighaüser's *Epictetew Philosophiæ Monumenta*, 3 vols. (Leipzig, 1799). They have been translated by Elizabeth Carter (London, 1758), and by Thomas Wentworth Higginson (Boston, 1891). The best critical edition of Arrianus is that of Dübner and Müller (Paris, 1846).

ARRIAZA Y SUPERVIELA, är'rē-ä'thȧ ē sōō'pĕr-vyā'lȧ, JUAN BAUTISTA (1770-1837). A Spanish patriotic poet, born in Madrid. After serving for several years in the navy, he abandoned it for a diplomatic career, and became secretary of the legation, first in London, and afterwards in Paris. He returned to Spain in 1807, and did important service for his country during the French occupation by kindling the national spirit with his stirring *Cantos patrioticos*, issued in 1810. Subsequently, having declared himself an unconditional supporter of absolute monarchy, he received an important appointment in Ferdinand VII.'s cabinet, in the department of foreign affairs. His earliest poems, *Las primicias*, appeared in 1793; *Emilia*, a didactic poem on the influence of the fine arts, in 1803. Though a master of form, Arriaza lacked real depth of feeling, and his poems owed their temporary vogue to their adaptability as popular songs. A complete collection of his verse is to be found in the *Biblioteca de autores españoles*, vol. 67, and a selection in Wolf's *Floresta de rimas modernas castellanas* (Paris, 1837).

ARRIÈRE (ä'ryâr') **BAN**. See BAN.

AR'RINGTON, LILLIE. See BURROUGHS, MARIE.

ARRIVABENE, är'rê-vä-bā'nā. GIOVANNI, Count (1787-1881). An Italian political economist, born in Mantua. He was arrested in 1820 as a revolutionary agitator, and was imprisoned for several months, but finally made his escape and took refuge in England. His political views had given the Austrian Government such deep offense, however, that in 1824 he was sentenced to death *in contumaciam*, and his property was appropriated by the State. While he was in London he devoted himself mainly to the study of political economy, and published *Beneficenza della città di Londra* (1828-32). He lived in Belgium from 1827 to 1859, and was one of the organizers of the Economic Congress held in Brussels in 1847. He was active in the founding of the Belgium Economic Society, and subsequently became its president. In 1860 he returned to Italy, was appointed Senator, and became president of the Economic Society of Florence. He did much to improve economic conditions in Italy. His principal publications are *Intorno ad un' epoca della mia vita*, 1820-22 (1860), *Memorie della mia vita*, 1795-1859 (2 vols., 1879), and he also prepared a translation in Italian of John Stuart Mill's *Principles of Political Economy*.

ARRO'BA (Sp. and Portug. from Ar. *arrub*, a quarter, from *al*, the + *rub*, fourth part). A weight commonly used in Spain, Portugal, Brazil, and in the principal Spanish and Portuguese colonies. In the first of these countries it is equivalent to the English quarter of a cwt., or 28 pounds; it is nearly the same in Portugal, etc. In Spain, the arroba is also a measure for wine, brandy, etc., and contains four of our quarts.

ARROM, CECILIA DE. See CABALLERO, FERNAN.

ARRONDISSEMENT, ä'rôɴ'dēs'mäɴ'. See FRANCE, paragraph *Government*.

AR'ROW (AS. *arewe*, *earh*, akin to the Goth. *arhwaz-na*, and Lat. *arcus*, bow). The most widely distributed in time and space, as well as in culture-grade, of all human artifacts. In the lowest known savagery it is not differentiated from the spear, javelin, harpoon, etc., and is headed with a tooth in zoömimic symbolism of the penetrating organ; in higher savagery it is used as a missile, projected with the aid of sling or atlate (throwing-stick), and in later stages with the bow. In still higher stages the arrow was enlarged for the crossbow and the catapult, and the device persists in modern archery.

ARROW, THE. A small northern constellation, between Aquila and the bill of the Swan.

AR'ROWHEAD'. An aquatic plant of the genus Sagittaria, to which the name is sometimes applied. See AQUATIC PLANTS.

AR'ROW-HEAD'ED CHAR'ACTERS. See CUNEIFORM INSCRIPTIONS.

AR'ROWPOINT', CATHERINE. A character in George Eliot's *Daniel Deronda*, a clever and very sensible young woman. Her parents wish her to make a great match, but she marries her music teacher.

AR'ROWROOT'. A variety of starch extracted from the roots of certain plants growing in tropical countries. It is a fine, starchy farina, valued as a delicacy for use in preparing puddings, desserts, etc., and as an easily digested food for children and invalids. It is obtained from the tuberous roots, or, more correctly, the root-stocks (rhizomes), of different species of the genus Maranta, belonging to the natural order Marantaceæ, and characterized by solitary ovules, a fleshy style curved downward, branching stems, and white flowers. The species chiefly yielding it is *Maranta arundinacea*, a native of tropical America, cultivated in the West India Islands, and growing about 2 feet high, with ovato-lanceolate, somewhat hairy leaves, clusters of small flowers on two-flowered stalks, and globular fruit about the size of currants. The roots (or rhizomes) contain a large proportion of starch. They are often more than a foot long, of the thickness of a finger, jointed, and almost white, covered with rather large paper-like scales. They are dug when a year old, washed, carefully peeled, and reduced to a milky pulp. By rasping or otherwise the roots are reduced to a pulp and the starch removed by bathing with water. Great care should be taken to prevent the starch souring and to insure cleanliness. The careful peeling of the roots is of great importance, as the skin contains a resinous matter, which imparts a disagreeable flavor to arrowroot, if allowed to mix with it. The West Indian arrowroot most esteemed in the market is grown in Bermuda; the next, and at most equal to it, in Jamaica. The East Indian arrowroot is not, in general, so highly valued, perhaps because substitutes for the genuine arrowroot more frequently receive that name. The *Maranta arundinacea* is now, however, cultivated both in the East Indies and in Africa. *Maranta indica*, which was supposed to be distinct from *Maranta arundinacea*, is now regarded as a mere variety of it, with perfectly smooth leaves. It is cultivated both in the East Indies and in Jamaica. Arrowroot is obtained also from *Calathea allouia* and *Clinogyne dichotoma*, plants closely related to Maranta. *Maranta arundinacea* is cultivated in Florida.

The amount of starch present in the roots of the Maranta varies according to age, and runs from 8 per cent., in those of the young plant, to 26 per cent. when full grown. The latter stage is reached when the plant is 10 to 12 months old; and the roots then present the following average composition per cent.:

Starch or arrowroot	26
Crude fibre	6
Protein	1½
Other carbohydrates, fat and ash	1
Water	65½

The prepared starch contains some 15 per cent.

water, 81 per cent. nitrogen, free extract (mostly starch), 1.8 per cent. protein, and very small amounts of fat and ash.

Arrowroot is a light, opaque, white powder, which, when rubbed between the fingers, produces a slight crackling noise, like that heard when newly fallen snow is being made into a snowball. Through the microscope, the particles are seen to be convex, more or less elliptical, sometimes obscurely triangular, and not very different in size. The dry starch is inodorous, but when dissolved in boiling water has a slight peculiar smell, and swells up into a perfect jelly. Potato starch, with which it is often adulterated, may be distinguished by the greater size of its particles, their coarser and more distinct rings, and their more glistening appearance. Refined sago-flour is used for adulteration: many of its particles have a truncated extremity; their surface is irregular or tuberculated. Arrowroot is also sometimes adulterated with rice starch, and with the common starch of wheat flour.

Large quantities of arrowroot are annually imported into the United States and Europe. As an article of diet, it is often prepared for invalids and children by merely dissolving it in boiling water and flavoring with sugar, lemon-juice, wine, etc. It is also often prepared with milk, made into puddings, etc. When most simply prepared, it forms a light meal. Arrowroot is a carbohydrate food, and hence a source of energy. As it contains little nitrogen, it is not very valuable for building and repairing body-tissue. When combined with eggs and milk, which are nitrogenous foods, a better balanced article of diet results. See NUTRITION.

A starch somewhat similar to arrowroot and partly known by the distinct name of *tous-les-mois*, is obtained from some species of the allied genus Canna (q.v.). But East Indian arrowroot is in part obtained from the tubers of *Curcuma angustifolia*. Other species of Curcuma (see TURMERIC), as *Curcuma Zedoaria*, *Curcuma leucorhiza*, and *Curcuma rubescens*, also yield a similar starch; the same tubers which, when young, yield a beautiful and pure starch, yielding turmeric when old. In Travancore this starch is the principal part of the food of the inhabitants. The young tubers of the galangale (q.v.), *Altinia galanga*, another plant of the same natural order (Scitamineæ), are another source of this starch. A starch somewhat resembling arrowroot, and often sold under that name, is obtained from different species of the natural order Cycadaceæ, as from the dwarf fleshy trunks of *Zamia tenuis*, *Zamia furfuracea*, and *Zamia pumila* in the West Indies, and from the large seeds of *Dion edule*, in the lowlands of Mexico. The Chinese prepare a similar starch from the tubers of species of Sagittaria. The starch of the cassava, manihot, or manioc (see CASSAVA) is sometimes marketed under the name of Brazilian arrowroot. Potato starch, carefully prepared, is sometimes sold as English arrowroot, and the starch obtained from the roots of the *Arum maculatum* (see ARUM), as Portland arrowroot. Otaheite arrowroot is the starch of *Tacca* (q.v.) *pinnatifida*. All these as well as cornstarch—the starch of maize or Indian corn—are so nearly allied to true arrowroot as not to be certainly distinguishable by chemical tests; but the forms of the granules differ, so that they can be distinguished by the microscope.

The name arrowroot is commonly said to have had its origin from the use of the fresh roots by the South American Indians as an application to wounds to counteract the effects of poisoned arrows; and the expressed juice has been recently recommended as an antidote to poisons, and a cure for the stings and bites of venomous insects and reptiles. But it is not improbable that, as has been said, the name is really another form of *ara*, the Indian name.

AR′ROWSMITH, AARON (1750-1823). An English cartographer, born at Winston, in Durham. He went to London at the age of 20. His publications include numerous topographic and hydrographic maps and charts, executed with the greatest care. His map of Scotland appeared in 1807, his *General Atlas* in 1817. His work on the *Geometrical Projection of Maps* was published posthumously (London, 1825). His son Aaron and his nephew John also published a number of cartographic works, and John (1790-1873) was one of the founders of the Royal Geographical Society.

ARROYO MOLINOS, är-rō′yō mō-lē′nōs (Sp. Mill Creek). A village in Estremadura, Spain. It is noted as the scene of the complete defeat of General Girard, one of Marshal Soult's lieutenants, by Lord Hill, October 28, 1811. General Girard had been sent out by Soult on a plundering foray with 5000 men, when he was surprised early in the morning by Hill, who had camped a league off at Alcuescar. The French colors, artillery, and 1300 prisoners were captured.

ARRU, ȧ-rōō′, **IS′LANDS.** A group of islands in the Arafura Sea, situated between latitude 5° 10′ and 6° 20′ S. and longitude 134° and 135° E., southwest of New Guinea (Map: Australasia, F 3). It consists of one large island, divided into the five parts of Kola, Wokan, Kobrur, Tragan, and Maikor, and a number of small islands. The islands are generally low and inaccessible. The chief commercial centre is Dobo. The population is estimated at 15,000, and consists of Papuans. The group belongs to the Dutch and forms an administrative dependency of the Moluccas (q.v.).

ARSACES, är′sȧ-sēz. See ARSACIDÆ.

ARSACIDÆ, är-săs′ĭ-dē, or **AR′SACIDS.** The name of the royal dynasty which ruled over the Parthian monarchy from its foundation in the middle of the Third Century B.C. until its destruction by the Persian Sassanidæ in A.D. 226. A branch of the dynasty was established on the throne of Armenia about B.C. 150, and outlived the Parthian Arsacidæ. The accounts concerning the Arsacidæ which have been transmitted to us by the ancient historians are exceedingly vague, confused, and contradictory, and modern criticism has found itself unable to reconcile or simplify the conflicting statements. The most important members of the dynasty of the Parthian Arsacidæ were Arsaces I. and Arsaces VI.

ARSACES (Gk. Ἀρσάκης, *Arsakēs*) I. delivered Parthia from the dominion of the Seleucidæ, kings of Syria. He is said by some to have been a Scythian by blood. An atrocious insult offered to his brother Tiridates by Pherecles or Agathocles, the Macedonian satrap of the country, is said to have fired his spirit and driven him to rebel. The Macedonians were expelled in B.C. 256. Antiochus Theos, King of Syria, was at war with Egypt, and was unable to recover this portion of his dominions. Seleucus, the son of Antiochus, made two unsuccessful expeditions against Arsaces, in the last of which he was taken prisoner. Arsaces I. now acquired regal power, built a city called Dara, on the mountain Zapaortenon, developed the internal resources of his new kingdom, and endeavored to organize it; and, after the conquest of several countries, died at a great age. Such, at least, is the account given by Posidonius and other writers. Arrian, however, states that Arsaces died after a reign of two years, and that his brother Tiridates succeeded him, under the name of Arsaces II., and ruled for 37 years. From this we should infer that many of the acts attributed to the founder of the Parthian kingdom were the work of his successor.

Arsaces VI., or Mithridates I., flourished about the middle of the Second Century B.C. He enlarged the territories of the Parthians by the conquest of Bactria, and is even supposed to have penetrated into India, and subdued the nations between the Hydaspes and Indus. In the year B.C. 138 he defeated and took prisoner Demetrius Nicator, King of Syria, whom, however, he treated generously, bestowing on him his daughter in marriage. He was a just and merciful prince.

ARS AMA'TOR'IA, ARS AMAN'DI, or **ARS AMO'RIS.** A famous work of Ovid, giving a set of rules for the conduct of love affairs. Of the three books, two are addressed to men; the third, to women.

AR'SENAL (Fr., Sp., Portug., arsenal, dockyard; It. *arsenale*, *arzana*, *arzanale*, arsenal, dockyard; cf. It. *darsena*, Sp. *dàrsena*, Portug. *taracena*, dock, and Sp. *atarazana(l)*, dock, all from Ar. *dār aççinā'ah*, workshop, factory, from *dār*, house + *al*, the + *çinā'ah*, art, mechanical industry). An establishment for the manufacture, repair, and storage of arms, ships, or munitions of war. In the United States the term is commonly applied to an establishment designed for the manufacture and storage of arms and munitions of war for the land forces; there are several naval arsenals, but these are merely storehouses for ammunition. In England the term has nearly the same signification. On the Continent of Europe the original meaning of the term is preserved, and, while there are many arsenals designed solely for the supply of the land forces, the great naval arsenals of Brest, Cherbourg, Toulon, Naples, Spezia, Venice, etc., are establishments in which ships are built, repaired, and fitted out, and in which equipments and naval stores are manufactured. The manufacture of guns is now generally carried on in gun-factories and small-arms factories (see Ordnance). Some of the non-explosive parts of ammunition are manufactured at the general arsenals, but the work of preparing explosives, and of filling cartridges and explosive shells, is commonly done at special arsenals or establishments at safe distances from centres of industry and population; and large quantities of ammunition are no longer stored in arsenals chiefly devoted to general military or naval industries. In the United States and in England the term *navy yard* (q.v.) corresponds almost exactly to that of *naval arsenal* on the Continent, the same class of work being carried on in each. A very large proportion of the munitions of war are now made in private works; and this, together with the desirability of specializing manufactures, has led to a reduction of the scope of work carried on in arsenals.

The first regular manufacture of war materials in the United States was in 1776, when gunpowder was made for the Continental forces; and in 1777 Springfield was chosen by General Washington as a suitable place for an arsenal. The manufacture of small arms commenced there in 1787, and has since continued. Harper's Ferry Arsenal dates from 1795, from which time other arsenals were gradually built, until the list of arsenals, armories, and ordnance depots under the control of the United States War Department in 1901 comprised the following establishments: Allegheny Arsenal, Pittsburg, Pa.; Augusta Arsenal, Augusta, Ga.; Benicia Arsenal, Benicia, Cal.; Columbia Arsenal, Columbia, Tenn.; Fort Monroe Arsenal, Fort Monroe, Va.; Frankford Arsenal, Philadelphia, Pa.; Indianapolis Arsenal, Indianapolis, Ind.; Kennebec Arsenal, Augusta, Maine; New York Arsenal, Governor's Island, New York City; Rock Island Arsenal, Rock Island, Ill.; Saint Louis Powder Depot, Jefferson Barracks, Mo.; Sandy Hook Proving Ground, Sandy Hook, N. J.; San Antonio Arsenal, San Antonio, Tex.; Springfield Armory, Springfield, Mass.; United States Powder Depot, Dover, N. J.; Watertown Arsenal, Watertown, Mass.; Watervliet Arsenal, Watervliet, N. Y.

AR'SENIC (Gk. Ἀρσενικόν, *arsenikon*, yellow orpiment, from ἄρσην, *arsēn*, male, masculine; alluding to its strong properties). A chemical element that was known to the ancients. It was distinctly referred to as early as 1694 by Schröder. It is found widely distributed in nature, though in small amounts. It is often found in the form of mammillated or kidney-shaped masses, but occurs also in well-crystallized form. It is found chiefly in the older rocks or in schists associated with other metallic minerals. The principal European localities are: Andreasberg, in the Harz Mountains; Joachimsthal, in Bohemia, and Freiberg, in Saxony. It is also abundant in Chile, Mexico, and New Zealand. In the United States it is found in Haverhill and Jackson, N. H.; Greenwood, Maine, and Leadville, Colo. In combination with sulphur, arsenic occurs as realgar and as orpiment, and with sulphur and iron as löllingite and as arsenopyrite or mispickel, called also arsenical pyrites. It is a common constituent of other minerals, but in small quantities only. The arsenopyrite is the usual commercial ore from which arsenic is obtained, and the process for its reduction is by heating the ore in earthenware retorts or tubes laid horizontally in a long furnace. As arsenic is quite volatile on heating, it condenses in the iron tube as a coherent crystalline mass, in which condition it may be detached from the tube when the latter is unrolled. The arsenic thus obtained may be still further purified by a second sublimation.

Arsenic (symbol As, at. wgt. 75.01) is a steel-gray, brittle metal, with a specific gravity of 5.23 to 5.76; it is a good conductor of electricity, and is odorless and tasteless. It volatilizes above 100° C., with a garlic-like odor, and is rapidly vaporized at a dull-red heat. It is used as a constituent of alloys, as white alloy, as speculum metal in bronzing brass, and in the manufacture of opal glass; also for hardening lead in the manufacture of shot. Arsenic and its soluble compounds are exceedingly poisonous.

Arsenic forms two oxides—the arsenic trioxide and the arsenic pentoxide. The former yields with basic radicals the salts called arsenites. It is commonly called *white arsenic*, arsenious acid, or flowers of arsenic, and is obtained in various metallurgical processes by roasting arsenic ores, during which the vapors of the oxide are volatilized and subsequently condensed in receptacles called poison chambers, or poison towers. The crude oxide is purified by one or more sublimations, yielding ultimately a white crystalline powder that is odorless, but has a weak, metallic, sweetish taste. It is the principal commercial compound of arsenic, and is used for the preparation of other arsenical compounds, in the production of green pigments, in the manufacture of glass, and as a poison for rats and vermin; also in medicine, in various compounds such as *Fowler's solution*, which is an arsenite of potassium. Arsenious oxide is used in medicine in treating many skin diseases, in anæmia, in chorea, in some forms of malarial fever, in cancer and other malignant growths, in neuralgia, in asthma, and in certain gastric conditions. It is an alterative, and is frequently used in connection with other tissue-builders or tonics during convalescence. Since small quantities produce poisoning, arsenic should be used only when prescribed by a physician. Chronic poisoning by this metal is not infrequent as it is much used in the arts, resulting in kidney disease and even paralysis. Yet it is asserted that in Styria the peasants consume arsenic daily—the women to improve their complexions, the men to increase their power of endurance. They are said to be strong and long-lived (see *Edinburgh Medical and Surgical Journal*, 1871, Vol. XVI., p. 569). Freshly precipitated hydrated oxide of iron, and the freshly precipitated hydrated oxide of iron with magnesia, are regarded as the best and most efficient antidotes for arsenious acid; but immediate removal of the poison by vomiting or purging is desirable. For its detection, three methods are commonly employed. Of these, the first consists in the treatment of the material submitted for examination with a strong alkali, and passing through the filtered liquid a current of hydrogen disulphide, which, if arsenic be present, produces a precipitate of the yellow sulphide. The precipitate may be further tested by dissolving in ammonia and evaporating until the residuary substance is reduced to metallic arsenic. Another method is the Reinsch process, in which, the preparation containing arsenic having been brought into solution, newly burnished pieces of copper foil are introduced into the liquid, and if arsenic be present it will at once be precipitated on the copper in its metallic form. It is said that by this method one part of arsenic can be detected in 250,000 parts of solution. A third, and perhaps the most useful, method is that invented by Marsh, which consists in treating the material with dilute sulphuric acid and metallic zinc in a gas-generating apparatus. The arsenic combines with the hydrogen liberated by the zinc, and forms arseniuretted hydrogen, which is then passed through a glass tube; on heating, it breaks up, depositing metallic arsenic in the form of a 'mirror' near the open end of the tube. In carrying out this operation, especially in criminal cases, the utmost precautions are necessary to insure the perfect freedom of the apparatus and reagents used from arsenic or similar substances capable of producing an arsenic-like 'mirror.' Among other things, the nature of the mirror may be demonstrated by dissolving it and testing the solution obtained by one of the usual methods. In order to detect arsenic in wall-papers or cotton fabrics, the Marsh test is usually employed—that is, the material is brought into solution, to which zinc and sulphuric acid are added, yielding the arseniuretted hydrogen. It frequently happens that the arsenic is contained in the fabric itself, so that the test must not be made with the dissolved color alone, but with the entire material. With copper oxide arsenious oxide forms a copper arsenite which is a pigment known as *Scheele's green*, largely used in calico printing and for wall-papers. With basic copper acetate it yields *Schweinfurth green*—called also emerald green, imperial green, and mitis green—which is a well-known pigment frequently used in the manufacture of wall-paper.

When acted upon by oxidizing agents, arsenious oxide yields arsenic oxide, which combines with basic radicals to form arsenates. Arsenic oxide, or arsenic acid, is used as an oxidizing agent in the preparation of aniline red, and also as a substitute for tartaric acid in calico printing.

Arsenic combines with sulphur, yielding an orange-yellow disulphide, which is found native as the mineral realgar and is used as a pigment and as a depilatory. A trisulphide also exists, which is found native as the mineral orpiment, which is used in pyrotechny and as a pigment for artists; also formerly in dyeing, and with quick-lime as a depilatory under the name of *rusma*.

ARSE'NIOUS AC'ID. See ARSENIC.

AR'SENOPY'RITE (From *arsenic* + *pyrite*), or MISPICKEL. An iron sulpharsenide that crystallizes in the orthorhombic system, has a metallic lustre, and is silver-white in color. It occurs associated with various ores of gold, lead, silver, and tin, in igneous crystalline rocks, and has considerable value as an ore of arsenic (q.v.).

ARSIN'OË (Gk. Ἀρσινοη). A Greek feminine name which was especially popular in the Macedonian dynasty of Egypt, the family of the Ptolemies. The wife of Lagus and the mother of Ptolemy I. was named Arsinoë. Other noteworthy princesses who bore the name were: (1) ARSINOË II., born about B.C. 316, the daughter of Ptolemy I. and Berenice. She was married in her sixteenth year to the aged Lysimachus, King of Thrace. The eldest son of this king, Agathocles, had previously married Lysandra, Arsinoë's half-sister. Arsinoë's brother, Ptolemy II. Philadelphus, afterwards wedded Arsinoë I., the daughter of Lysimachus. Arsinoë II., wishing to secure the throne for her children, prevailed on her husband to put Agathocles to death. Lysandra, however, fled with her own children to Seleucus of Syria, and induced him to declare war against her father-in-law, who lost his life and kingdom. Arsinoë II. sought refuge in Macedonia, which was also seized by Seleucus. After a few months, Ptolemy Ceraunus, the half-brother of Arsinoë II., assassinated Seleucus; and in order to gain possession of Arsinoë's sons, whom he feared as rivals to his ambition, he offered marriage to his half-sister. She consented to the union and opened the gates of the town in which she had taken refuge, whereupon her suitor caused her sons to be killed before her eyes. Arsinoë fled to Egypt (B.C. 279). Her own brother, Ptolemy Philadelphus, banished his wife, Arsinoë I., to Coptos, and married Arsinoë II., beginning thus the series of sister-marriages which were in accordance with the Egyptian custom and exactly opposed to the Greek tradition. Arsinoë II. had no children by her brother, and adopted the three children of Arsinoë I. Her husband showed great affection for her. He named the capital of the Fayum (the Arsinoite nome) after her, and had a splendid tomb and memorial temple erected to her by the architect Dinochares, who is said to have roofed it with loadstones, so that her iron statue seemed to float in the air. She seems to have assisted Ptolemy in the government. (2) ARSINOË III. was sister and wife of Ptolemy IV., Philopator, who caused her to be murdered soon after the birth to her of an heir. (3) ARSINOË IV. was daughter of Ptolemy XI., Auletes (B.C. 80-51). She fled from Alexandria when Julius Cæsar was besieged in it (B.C. 48), and was received as queen by the Egyptian troops so long as her brother, Ptolemy XII., Dionysus, remained in the hands of Cæsar. Captured by the Romans, she was led in triumph through Rome; afterwards she was liberated, and returned to Egypt. Her famous sister, Cleopatra VII., persuaded the Triumvir Antony to have her murdered at Ephesus (B.C. 41), although she had taken refuge in the temple of Diana.

AR'SIS and **THE'SIS.** See BEAT.

AR'SON (OF. from Lat. *ardere*, to burn, particip. *arsus*). In the laws of all civilized countries, a crime of the deepest atrocity. At common law, it consisted in the burning of the house of another, willfully and of malice aforethought, and was a felony, punishable by death. In the long and painful history of the criminal law, it is said to have been the first offense in which the question of the *mens rea*, or criminal intent, of the act was taken into account. In essence the common law of arson remains substantially unchanged in the United States as well as in England, notwithstanding some statutory modifications and the general mitigation of the penalty incurred by the commission of the crime. Unless it results, directly or indirectly, in the death of some person—in which case it comes under modern definitions of the crime of murder—it is no longer punishable by death, but by imprisonment for periods varying with the degree or atrocity of the offense, sometimes for life. There must be an actual lighting and burning, in order to constitute the crime, and it must be deliberate, and not accidental, or the mere result of carelessness. The premises need not, however, be consumed, an actual blaze, ignition, or charring being enough. Generally speaking, it is not arson to burn one's own house, even with the intent to defraud an insurer, or to destroy the personal property of another on the premises; though this act, when done with such an illegal intent, was also a crime—usually a misdemeanor—at common law, and is now, in some of the United States, defined as a lower degree of the crime of arson. In New York it is arson, under the penal code, to set fire to any building, even though it be that of the accused, in which there is at the time a human being. For the particular treatment of this crime in this country, the reader is referred to the codes and statutes of the several States. Its early and later history has been fully told in Pollock and Maitland, *History of English Law* (Boston, 1899), and in Stephen, *History of the Criminal Law of England* (London, 1883); also Stephen, *Digest of the Criminal Law* (5th ed., London, 1894); Russell, *Treatise on Crimes and Misdemeanors* (6th ed., London, 1896); and the authorities referred to under CRIMINAL LAW.

ARS POET'ICA (The Poetic Art). A discussion of dramatic poetry by Horace, called also EPISTLE TO THE PISOS. In it Horace develops the laws of dramatic composition, and adds suggestions and comments from his own experience.

ART (Lat. *ars*). Broadly speaking, the word art stands for any object produced by the mind and hand of man; that which is not immediately a product of nature; that which is artificial, which is opposed to the natural, in the creation of which human skill has intervened. The shaft of a tree is natural; shaped as a ship's mast, and perhaps further ornamented, it has entered a low grade of art, the material grade, and has become useful. In the present discussion the word art is used in the sense of fine art, as opposed to the useful and industrial arts, and its end, unlike those, is to give pleasure. The kind of pleasure must, however, be somewhat closely defined, for its range and quality are not without certain limitations. For perhaps greater clearness it may be well to contrast the province of 'fine art' with examples of other pleasure-giving activities of the human mind, and of the lesser industrial arts. The appliances of science, light-producing, heat-producing, sound-transporting agencies, the results of mechanical or industrial arts, contribute to the pleasure, comfort, and sociability of life; but they are the result of applied and scientific principles and of the exact sciences, and for their appreciation do not call for that particular quality of pleasurable mental effort which the contemplation, and knowledge, and enjoyment of pure beauty exacts and affords. There are many pleasures of which our human economy is susceptible, but which may not be ranked among the pleasures of art (see ÆSTHETICS); for the word art under this head is confined more strictly to its expression in painting and sculpture.

Art is perhaps entitled to be deemed the highest factor in civilized life, because it is the most unselfish. Sight is the sense it appeals to chiefly, but it is only that through this sense it may reach the mind; so it is a mistake to think that sculpture and painting end with visual enjoyment merely. There are higher and less high emotions to which art appeals, and it is the perceptible exercise of rare judgment and of taste that stamps a so-called work of art 'fine.' There are pictures existing, and examples even of musical composition, betraying a mind of such puerile character that the fact that they have been produced in obedience to the technical exactions of these respective arts in no way warrants them in being called 'fine.' Fine art consists not merely in technical address; and yet there is a certain perfection of *virtuosity* so intelligent, displaying such a rectitude of taste, and such a refined instinct for the fitness of things, that it is pleasure-giving to the degree of becoming æsthetic. Through "the happy and dexterous way in which a thing slight in itself is handled" it may become an object of 'fine art.' Material subjects also may serve as acceptable themes for the fine arts, if treated with such fitness that they do not offend the æsthetic sense. Veronese apotheosized the subject of feasting, a low and material theme in itself. His, or any painter's, success in problems of this kind is a sign of the artist. True artists perceive the limitations of their art and never overstep them: and, indeed, fine art has to-day become synonymous with the exercise of fine taste in many departments of mental effort and individual handicraft.

It is very evident that the production of a work of high art which requires great abstraction of mind could never have occurred in the early and savage period of the human race. That was a period of self-preservation and a fight for mere existence. As time went on and life became more complex, there was leisure for the mind to employ itself in other matters; and with the complete emancipation of the human intellect, such as exists to-day, there has come an imperative demand for expression in a language that is as potent as that of uttered speech—the beautiful and universal language of art. In painting, its vocabulary is form and color; but these, in fine art, must be so used as to express the ideas and emotions excited in the artist by things seen. Imitation merely will not do this, so the artist must make use of seen things to denote certain attitudes of mind and emotions of the soul. A work of art must not so far stray from truthful representation as to irritate the mind of the beholder by its offenses against structural truth, but, on the other hand, art is not achieved through strict imitation. Art is many-sided—the æsthetic sensibilities are touched in such a variety of ways that it is somewhat difficult to fix definitely the channels through which painting and sculpture may legitimately reach the human mind and still rest within the limitations that these mediums exact on the part of the producer. It is certain, however, that the beholder of a painting or statue should receive the impression of a mind employing the materials of a particular craft with perfect control and judgment, of a mind dominated by such taste that the language —that is to say, the medium used—is made to voice ideas that are better expressed by such means than by any other. Hence, the objection to so-called 'literary' art, or 'story-telling' art, in pigment and in clay. Subjects which are more effectively rendered through verbal form, and which, to be understood pictorially, require a page of explanatory notes, are not so pleasure-giving, in the graphic arts, as those which immediately strike the mind, through the eye, by their elevation of sentiment and the opportunity they afford the artist for noble lines and charming qualities of paint. Both these arts are, as has been said, *imitative;* but the true artist recognizes in the exercise of his craft to what point his imitation of nature may legitimately carry him. This knowledge may be revealed to him by the consideration of the class of emotions it is his intention to excite. Consult: Harris, *Theory of the Arts* (London, 1869); Frothingham, in *American Journal of Archæology*, vol. IX. (1894); Taine, *Lectures on Art* (New York, 1899); Lange, *Das Wesen der Kunst* (Berlin, 1901); von Kunowski, *Schöpferische Kunst* (Leipzig, 1902); Noyes, *The Enjoyment of Art* (Boston, 1903). See also the *Bibliography* of ÆSTHETICS.

ART, HISTORY OF. The monuments produced by the artistic faculty represent in the most concrete form the different stages and kinds of human activity on its more ideal side, and are intimately connected with the two other main spheres of *science* and *industry*, to whose products art is often called upon to lend beauty and interest. Within the sphere of art itself, the *social* arts of religion, philosophy, and government supply not only the *literary* arts, but also the *formative* arts of architecture, sculpture, and painting, with their themes and their inspiration, without which works of art would have little importance in the development of civilization. The fine arts, in order to attain a high standard, must therefore embody some higher idea. A Greek temple, a Gothic cathedral, a Mohammedan mosque, a Benedictine monastery, a triumphal arch, an amphitheatre, a Roman villa, a feudal castle, represent religious and social forces, above and beyond fine art, which mold these monuments so that they are part of the larger life. The form, arrangement, decoration, and purpose of such buildings are no part of 'art for art's sake.' So it is with works of sculpture and painting—with a Phidian Zeus, a Byzantine Christ, a Cimabue Madonna borne in triumphant procession, an Immaculate Conception by Murillo. Greek mythology and Christian dogma are as much embodied in art as in literature; art has been regarded for as many millenniums as a means of teaching as it has been for centuries as a means of pleasing. The fact, therefore, that works of art, though produced under their own special organic laws, are governed by the general laws of the civilization to which they belong, brings, as a necessary consequence, the result that these works, like everything else in civilization, are a mixture of good and evil, true and false, and that the customary æsthetic opinion that beauty alone is the aim of art is contradicted by both theory and practice. Such a standard could not be applied to the novel or the drama in literature, as it would eliminate a majority of masterpieces; neither can it be applied in art. Any work that has a distinct significance and character is artistic, whether its theme is moral or immoral, its form beautiful or ugly, and whether it is inspired by a sentiment of the grotesque, the deformed, and the fearsome, or of the sublime and the beautiful. It is from this point of view that the articles in this Encyclopædia have been written.

A study of the history of art will show that through the four thousand or more years during which such works were produced before the Fifth Century B.C., the æsthetic pleasure they gave was practically independent of the human figure and was dependent on effects of color and material forms. The exquisite appreciation of color among the peoples of western Asia and the grandiose combinations of architectural lines and masses among the Egyptians were the keynotes of this long period, of this lower and material stage, when the human figure was used as a higher species of hieroglyph, as a means, not an end. The long, painted processions in an Egyptian tomb; the friezes in relief of an Assyrian palace, were a part of ceremonial or contemporary history. With the Greek art of the Sixth and Fifth centuries, art enters upon a higher mission; this mission becomes both more definite and more ideal, centring around the human figure. It is the plastic stage of ancient art. Even in architecture it is questions of outline, proportion, and rhythm that predominate, in place of the earlier material ideas of colossal mass. Color became subsidiary and remained crude, never attaining among the Greeks to the harmony and subtlety of Asiatic art. The human form was for the first time idealized in plastic form and made to express types and thoughts beside mere external facts. The next change was heralded in the Alexandrine Age and fully embodied in Roman civilization. Art became pictorial and psychological; Greek simplicity became complex. Portraits replaced types; the variegated porphyries, serpentines and other strong-colored marbles succeeded the white Parian; in place of the cameo-like Attic reliefs on a single plane without background we have first the picturesque scenery of the Alexandrine relief and then the two and three planes of the imperial Roman sculptures. Even architecture was fundamentally modified. The Hellenic Greeks had placed their buildings singly and with an unerring eye for beauty on the appropriate natural site; but each one was for itself. Under Rome, architectural composition is developed, and the grouping of coördinate structures, the planning of stupendous interiors, becomes a large part of the art, accompanied by wonderful richness of color in decoration. There is plastic loss and picturesque gain. In harmony with the new love of luxury, art is made to minister to private as well as to public life. Its bounds were thus immeasurably enlarged while its ideals were lowered. Philosophically speaking, the fit closing of an artistic era was now reached; all the changes had been rung.

When the Christian Revolution set in, art was regenerated, as a consequence of the religious and social regeneration. The second era began, of course, by a reconstruction in the higher spheres of religious and philosophic thought and the state; until their currents could reach and revivify the fine arts, until new artistic forms could be created to express suitably these new ideas, the result was necessarily inadequate, as it had been, for example, in the centuries of Greek art before Phidias. As a natural reaction from the previous worship of beauty of form, Christian art went at first to the other extreme of caring merely for the content. The decay of skill went with a carelessness as to its acquisition. Like the Egyptians and Assyrians, the artists of the early Christian and Byzantine periods used figures largely as hieroglyphs, for purposes of instruction, but the things taught were fundamentally different; they were the things of the spirit. A true history of Christian sculpture and painting up to the Renaissance should deal but little with the technique and mainly with the theme, not with the æsthetic pleasure, but with the internal significance. Imperfection of form was regarded as immaterial. This point of view once secured, it becomes clear how we should study the frescoes of the Catacombs to reach the heart of Christianity before the stage of theological definitions; how the dogmas and beliefs of the Eastern Church are set forth in illuminated Bibles and in the mosaics and frescoes of Byzantine churches, from Saint Mark at Venice, and from Monreale to Mount Athos; how the encyclopædic learning and dominant thoughts of the Middle Ages can be grasped in the sculptures and glass windows of such French Gothic cathedrals as Chartres, Rheims, and Amiens. The intellectual quality of this art is shown in the supremacy of geometric law and constructive thought in an architecture which is the embodiment of the triumph of mind over matter—the antipodes of Egyptian architecture. During this pre-Renaissance period there was the greatest variety of stages: in the West the only time when the external expression was adequate to the ideas involved was the period of the Gothic cathedrals, which in many ways was the exact counterpart of the Hellenic development of the Fifth and Fourth centuries B.C. (Phidias to Lysippus), in the same way as the earlier Christian period had corresponded to the Oriental stage and the later Renaissance period was to mirror the Roman stage of ancient art. It is interesting to follow out this analogy; to see how portraiture, psychologic study, picturesqueness, and the supremacy of painting are characteristics of the Renaissance as of Roman art, but on another plane, in which the keynote was furnished not by architecture, as with the Romans, but by sculpture.

The Renaissance is the last and pictorial stage of the second era in art history. Michelangelo was its supreme embodiment, the Sistine ceiling its clearest expression. Renaissance architecture was plastic, not constructive—a decorative system. The simple composition, the clear outlines of the painting of the Fifteenth and Sixteenth centuries have also a plastic underlying basis. At this moment we have hardly enough perspective to see clearly just where the Renaissance merges into modern art, but one thing is certain, modern art carries the standard of painting in the van. It has not yet created its own types of architecture or sculpture; in these spheres it lives mainly on models of the past. But in painting it comes to self-consciousness and is truly original. This prominence of the most material of the arts is in harmony with the prevalence of the industrial ideals in science and all other forms of civilization. When, under utilitarian and rationalistic impulses, new forms of architecture and sculpture develop, it is safe to say that they will be governed by pictorial standards.

The details illustrating the historic development of the fine arts are given in both general and special articles. First, there are three general historic sketches on ARCHITECTURE, SCULPTURE, and PAINTING. Then come two classes of general articles: those on special styles broader than nationalities, and those on national styles. To the former belong Byzantine, Gothic, Mohammedan, Renaissance art, which spread over several countries. Within such styles there are, of course, the national subdivisions; but these are subordinate to certain general laws or characteristics of the style. Thus French Gothic and Renaissance are very distinct from Italian and German; Armenian and Coptic Byzantine from Hellenic; Persian and Spanish Mohammedan from Egyptian. The second class, of national arts, is especially important in ancient times before the Greeks had drawn the East and West so close together. So, Egyptian art and Assyro-Babylonian art possess distinctly national styles. Minor nationalities like the Hittites and Phenicians are, it is true, strongly influenced in their art by elements borrowed from these two great civilizations; but not sufficiently so as to cast national traits into the shade. In any case, whether national or stylistic traits predominate, it has been thought best to trace the history of art separately under each principal country.

The next group of articles gives classes of general subheads: (1) of *style*—as, for instance, of Doric, Ionic, and Corinthian under ARCHITECTURE; of Early English Decorated and Perpendicular under DECORATED STYLE; PERPENDICULAR; (2) of *branches of art* from the point of view of material: for instance, CARPENTRY and MASONRY, as branches of architecture; BRONZE, TERRA-COTTA, IVORY, and WOOD-ENGRAVING, GOLDSMITH'S WORK, ENGRAVING and ENAMEL, as branches of sculpture; MOSAIC, FRESCO, TEMPERA, MANUSCRIPTS, ILLUMINATION OF, TAPESTRY, and STAINED GLASS, as branches of painting; (3) of *classes of monuments* from the point of view of their use. Under ARCHITECTURE, the general headings of *religious*, *civil*, and *military*, where these themes are treated historically, are each subdivided: religious architecture into such heads as TEMPLE, CHURCH, CATHEDRAL, MONASTERY, BAPTISTERY; civil and domestic architecture into such as CITY, FORUM, PALACE, BUILDING, VILLA, MAUSOLEUM, THEATRE, AMPHITHEATRE, CIRCUS, BATH, TOWN-HALL, ARCH TRIUMPHAL, AQUEDUCT, BRIDGE; military architecture into such as ACROPOLIS, CITADEL, CAMP, CASTLE. Certain subtitles are somewhat more special than these; such as the names of structures confined to a certain style, like OBELISK and PYRAMID in Egyptian art, or those confined to a religious sect and style, like ALCAZAR, CARAVANSERAI, KHAN, MINARET, and MOSQUE in Mohammedan art, or the CATACOMBS in Early Christian art; such also are subordinate buildings or parts of buildings, like CLOISTER, CHAPTER-HOUSE, and DORMITORY, which are parts of a monastery, or KEEP, BAILEY, TOWER, BASTION, and BARBICAN, which are parts of a castle; APSE, CHOIR, NAVE, TRANSEPT, CRYPT, CLEARSTORY, which are parts of a church. Similar classes of works obtain also under sculpture and painting. For example, in sculpture come PULPIT or AMBO, TOMB, RELIQUARY, CHALICE, CROSS, HERM, etc.; in painting are such terms as FRESCO, TRIPTYCH, etc. Next, class (4) includes *works of sculpture and painting* classified according to subject, the general rules of which are laid down in two general articles, one on MYTHOLOGY IN ART, for the ancient world, and one on Christian ICONOGRAPHY, for the period beginning with the Christian era. The history of the artistic treatment of each such important theme is given under separate heads, which are enumerated in these two articles. Such are the myths and types of the Olympian gods, the chief exploits of personages like HERCULES, THESEUS, and PERSEUS, and the heroes of the *Iliad* and of Greek tragic poets, not to mention great historic personalities. Similarly, for Christian art, the types and events of the life of Christ, the Virgin and the Apostles; themes like the NATIVITY, CRUCIFIXION, and LAST JUDGMENT. Other general articles in this series are PORTRAITURE, LANDSCAPE, etc.

Class (5), *technique of the arts*, comprises the greatest number of separate heads. A few of the articles are of some length, such as COLUMN, DOME, ARCH, VAULT, MOLDING, including both definition and history, but the majority consist of brief definitions, as in the case of such architectural members as ARCHITRAVE, FRIEZE, and CORNICE, composing the classic entablature, as well as DENTIL, FASCIA, CORONA, MUTULES, details of this entablature, and CABLE MOLDING, PALMETTE, and other moldings and ornaments of the same. Reference to the comprehensive articles will secure complete references to the smaller units. The great majority of such technical terms belong to the field of architecture, and include all the building implements under such heads as AXE, DRILL, HAMMER, CRANE, DERRICK, DRESSING, STAGING, QUARRY. The processes of sculpture are explained under CARVING, FOUNDING, RELIEF SCULPTURE, ALTO-RILIEVO; those of painting under DRAWING, PERSPECTIVE, ENCAUSTIC PAINTING, TEMPERA, FRESCO, etc.

Class (6) consists of articles illustrating *manners and customs* in which art and artistic forms of industry have at least an important part. Some are general, historic, and descriptive, as COSTUME, FURNITURE, BURIAL, BRICK, ARMOR, JEWELRY, and under such headings will be found references to the more specific headings; in this field especially it is impossible to distinguish between art and archæology. The next series, class (7), consists of a *topographical* treatment of monuments. In the case of every city or town containing monuments of unusual importance and significance in art-history, the conventional guide-book information, which is sufficient in ordinary cases, is abandoned for a systematic scholarly treatment. Such is the case in cities like VENICE, ROME, ATHENS, CAIRO, FLORENCE. It is the same with places like POMPEII, which illustrate any period with great fullness. Ancient sites that are now mere ruins—like BAALBEK, PALMYRA, BABYLON, SELINUS, CARNUNTUM—are described. Even single works are picked out for separate description; ancient monuments, such as the PARTHENON and the PANTHEON; the Egyptian temples at EDFU, KARNAK, and PHILÆ; the mediæval monasteries of MONTE CASSINO, CERTOSA, CLUNY, MELROSE; the chateaux of CHAMBORD, CHENONCEAUX; the villas MEDICI, LANTE, GIULIA; the palaces of the DOGES, the PITTI, STROZZI, LOUVRE, LUXEMBOURG, TUILERIES; the churches SAINT PETER, SAINT PAUL; the ALHAMBRA, and many more. Finally, class (8) comprises the *biographies* of the most prominent personalities in art history, not merely the men who are popularly known, but all those who have been leaders and contributed original work. Such men have usually been referred to in the general historical articles, but details have been in each case reserved for the biographies. Such men were: In Greek architecture, ICTINUS and MNESICLES; in Roman architecture, APOLLODORUS; in Byzantine architecture, ANTHEMIUS; in the Italian Middle Ages, ARNOLFO DI CAMBIO; in French Gothic, ROBERT DE LUZARCHES; in Renaissance, BRUNELLESCHI, BRAMANTE, LESCOT, and DE L'ORME. In the fields of sculpture and painting the leading men are too numerous to mention, and will be enumerated in the general articles on these subjects.

To recapitulate, any one wishing to gain information in this field can get access to the mass of articles by simply passing systematically from the more general to the more special articles in each branch, each article having a list of references that will pass the reader along, and the whole series being arranged so as to avoid repetitions and secure a complete mosaic picture in the end which can be supplemented by the use of the bibliographical lists at the close of the general articles.

TABLE OF ART HISTORY.

ORIENTAL.	
Babylonian	(c.6000-500 B.C.)
Egyptian	(c.5000- 50 B.C.)
Assyrian	(c.1500-600 B.C.)
Hittite	(c.1500-700 B.C.)
Phœnician	(c.1500- 50 B.C.)
Jewish	(c.1000 B.C.-70 A.D.)
Persian	(c. ? B.C.-600 A.D.)
Chinese	(c.2000 B.C.-1800 A.D.)
Japanese	(beg. c.600 A.D.)
Indian	(beg. c.500 B.C.)
WESTERN.	
Pelasgic	(c.2500-800 B.C.)
Hellenic	(c.1000-100 B.C.)
Etruscan	(c.1000-200 B.C.)
Roman	(c.300 B.C.-400 A.D.)
CHRISTIAN.	
Early Christian	(c. 100- 800 A.D.)
Byzantine	(c. 400-1450 A.D.)
Romanesque	(c. 800-1200 A.D.)
Gothic	(c.1150-1450 A.D.)
Renaissance	(c.1400-1700 A.D.)
Modern	(c.1700-present.)

BIBLIOGRAPHY. ART, History of. References: Reber, *History of Ancient Art*, and *History of Mediæval Art*, German orig., and English trans. (New York, 1887); Schnaase, *Geschichte der bildenden Künste* (best and fullest), 8 vols. (Düsseldorf, 1866-79); Lübke, *Grundriss der Kunstgeschichte* (Stuttgart, 1873), and English translation, edited by Cook, *Outlines of the History of Art* (New York, 1878); Von Sybel, *Weltgeschichte der Kunst* (Marburg, 1888). These works treat the arts as a whole. A series of three handbooks published recently by Longmans, treats each main branch in itself; Hamlin, *History of Architecture;* Marquand and Frothingham, *History of Sculpture;* Van Dyke, *History of Painting;* Georges Perrot, assisted by Ch. Chipiez, has undertaken a *Histoire de l'art ancien* (Paris, 1881, et seq.) on a large scale, with great success; it has at present reached the Archaic Period in Greece, seven volumes have appeared, as follows: I. *Egypte;* II. *Chaldée et Assyrie;* III. *Phénicie et Chypre;* IV. *Lydie, Judée*, etc.; V. *Perse;* VI. *Grèce primitive;* VII. *Grèce de l'épopée, Grèce archaïque.* No corresponding comprehensive work has been undertaken for the period following the Christian era; the nearest approach being Kraus, *Geschichte der christlichen Kunst*, 2 vols. (Freiburg, 1896). Contemporary literature material for the study of art of the ancient period may be found in Overbeck, *Die antiken Schriftquellen* (Leipzig, 1868); and for the mediæval period Eitelberger, *Quellenschriften für Kunstgeschichte und Kunsttechnik des Mittelalters und der Renaissance* (Vienna, 1871-82). For the lives of the great classic artists, consult: Brunn, *Geschichte der griechischen Künstler* (Stuttgart, 1889), and for those of later artists Dohme, *Kunst und Künstler des Mittelalters und der Neuzeit* (Leipzig, 1886), and the *Künstler-Monographien*, edited by H. Knackfuss (Bielefeld, 1895, et seq.). The archæological material illustrating the history of art is best presented for the classic period in Darenberg and Saglio, *Dictionnaire des antiquités grecques et romaines* (Paris, 1893, et seq.); Smith, *Dictionary of Greek and Roman Antiquities* (London, 1890), and in Pauly-Wissowa, *Real-Encyclopadie der klassischen Altertumswissenschaft* (Stuttgart, 1884, et seq.). A good example of the publication of a complete corpus of monuments for any one period is Garrucci, *Storia dell' arte cristiana*, in six volumes (Prato, 1873-81) containing all the known monuments of early Christian art—except architecture.

ART, PRIMITIVE. The motives which lead to the production of works of art and the capacity for æsthetic enjoyment seem to be common to men at all levels of culture. We cannot speak, then, of the origin of art in an absolute sense, but only of the first stages of development both in artistic production and in æsthetic appreciation. It is difficult to tell just what primitive peoples themselves regarded as beautiful. Even when we have laid before us articles which seem to involve appreciation of the beautiful—as, for example, carved figures on weapons and cooking utensils—and even when we read of the war-dance or the corroboree, or of the practices of tattooing or scarring, it is not easy to tell what emotions were aroused in the primitive mind by the contemplation of these things. A symmetrical spear was more useful than a crude asymmetrical one; a dance may have been intended to appease some god or to bring luck in hunting, as the buffalo-dance of some Indian tribes; a series of figures on a bone knife may have been a kind of picture-writing; it may have been a mark of individual or tribal ownership; or the figures on a bit of pottery may have simply copied the woven pattern of a more primitive utensil. So that we must distinguish what was done from utilitarian, or religious, or social motives, or for communication, or from simple habit, from what was the result of æsthetic impulses. As a matter of fact, it is highly probable that for a long time purely æsthetic impulses and purely æsthetic productions were rare—that a thing was at once useful and artistic, or religious and artistic, or social and artistic. It is, then, one of the chief problems which artistic origins furnish, to disentangle the æsthetic from the non-æsthetic. For this two things are required. The investigator must know the essential ingredients of the æsthetic consciousness, both on its productive and on its contemplative side, and he must know where the most primitive conditions are to be found. The first requirement is psychological. It takes into consideration the elementary æsthetic feelings (see ÆSTHETICS, EXPERIMENTAL), other feelings, emotions, and organic sensations, and the general and special associative factors (brought from the experiences of the individual and of the social group to which he belongs) in the more complex judgments of taste. The second requirement is anthropological. It asks: "What is a 'primitive people'? What is 'primitive culture'?"—assuming that the most primitive art is to be found on the lowest level of civilization. Perhaps the best guide to the primitiveness of a tribe or race is to be found in its means of livelihood. Hunting and fishing evidently take lower rank than agriculture or cattle-raising. They imply simpler social conditions and a lower grade of mental development. Fortunately, some of the hunting tribes are still in existence, and offer object-lessons in primitive culture. Among them there is almost no social organization, and life is reduced to extremely simple conditions. Even here, however, evidences of artistic appreciation are by no means rare.

The chief modes in which primitive man expressed his love for beauty are by ornament and in the dance. Painting, plastic art, literature, and music were not, however, entirely lacking. A passion for bodily adornment is characteristic of primitive man. He smeared his body with red, yellow, black, and white cosmetics, tattooed and scarred himself, loaded himself with nose, lip, and ear rings, necklaces of shell and bone, bracelets and anklets, and arranged his hair in the most fantastic fashions; clothing, even, was worn more for adornment than as a covering to the body. As civilization advanced, ornament migrated from the body to the implements and utensils and to the clothes, displaying itself in rich and variegated garments such as are to be seen to-day in the royal attire of Oriental monarchs and in the holiday dress of peasants. From clothing it passed to the decoration of the home, to places of worship, and to public buildings. This is a natural sequence of the widening of the individual's interests in the development of a highly organized society.

An expression of the primitive artistic impulses, which has a greater social significance than ornament, is to be seen in the dance, which was more truly a matter of æsthetics than it is in civilized communities. The essential element in it was energetic and rhythmic movement. It was either simply gymnastic, giving free play to muscular activities, or mimetic, reproducing the actions of beasts and birds and portraying the emotions of love and war. The paintings, drawings, and carvings of primitive tribes furnish a less important means of expression. They are represented by the rock pictures of the Australians, the bone carvings of the Eskimos, and the drawings of the Bushmen. They are remarkable for their careful and faithful representations of natural objects—largely animals—with which the artist was familiar. Their excellence is to be attributed to the careful observation and the manual dexterity which distinguishes the hunter from the agriculturist. Even the drama and the art of poetry are represented among primitive peoples. A limited number of poems have been collected which are real expressions of emotion and which attempt metrical form. Love and nature are seldom employed as themes. The poet sings, by preference, of himself. But the form, rather than the matter, seems to be the essential æsthetic element; since the words are, in many instances, replaced by meaningless syllables, while the rhythmical movement of the verse has been carefully preserved and retains its original emotive value. The drama grew naturally out of the dance and song. Pantomimic dramas came very early. They have been found among the Australians, the Eskimos, and the Tierra del Fuegians. With the drama comes the song, which is likewise related very intimately to the dance. It has even been said of some primitive peoples that they never dance without song and never sing except in the dance. Thus we see that music, too, has a prominent place in their lives. It is without doubt true that the voice was the first musical instrument, and that the cadences of emotional utterance, the sounds of nature, and the construction of crude musical instruments—the drum, the flute, and the trumpet—all conduced to the development of music. Primitive music is characterized by melody in which the rhythmic element (made precise by the dance) is far in advance of the harmonic element. The intervals are fewer in number than with us and not so sharply defined, while polyphony is practically unknown. See MUSIC.

Consult: Grosse, *The Beginnings of Art* (New York, 1897); Tylor, *Anthropology* (New York, 1889); Hirn, *The Origins of Art* (London, 1900).

ART, SCHOOLS OF. See DESIGN, SCHOOLS OF.

ARTA, är'tȧ (the ancient *Ambracia*). An episcopal city of Upper Epirus (Map: Greece, C 2), situated ten miles from the northern coast of the gulf to which it gives its name, and 39 miles south of Janina. It stands on the left bank of the river Arta, the ancient *Arachthus*, whence the modern name, which was first used in the Thirteenth Century. It has a considerable trade in wine, agricultural products, tobacco, oranges; and manufactures, chiefly of cloths and leather. The ancient Ambracia (Ambrakia) was settled by the Corinthians about B.C. 640, and later became an independent republic. It was the capital of Epirus under Pyrrhus; its decline was begun by its seizure in B.C. 189 by the Romans, and its importance was utterly destroyed when Nicopolis was settled, B.C. 31. The city received a new lease of life under the Byzantine emperors, and in the Thirteenth Century was the capital of the Despot of Epirus. After various changes of rulers, Arta became in 1449 a Turkish possession, and remained such. It was ceded to Greece as a result of the Treaty of Berlin in 1878. Population, in 1896, 7582.

ARTA, GULF OF (anciently, Lat. *Sinus Ambracius*). An arm of the Ionian Sea, 25 miles long and 10 miles wide, forming part of the boundary between Epirus and Greece. A bar at its entrance detracts from its usefulness. It is noted as the landing-place of Philip V. of Macedonia (B.C. 218), during the war with the Achæan League, and for the naval battle of Actium (q.v.) fought at its mouth 31 B.C.

AR'TABA'NUS (Gk. *'Αρτάβανος*, *Artabanos*) (?—226 A.D.). The last king of Parthia. After his kingdom had been devastated by the army of Caracalla, Artabanus gave battle to Macrinus, near Nisibis (217). After two days of desperate fighting, the Romans were defeated and peace was concluded. During the war Artabanus lost his best troops, and the Persians seized the opportunity of recovering their independence. Led by Artaxerxes (Ardashir), the founder of the dynasty of the Sassanidæ, they defeated the Parthians in three great battles, in the last of which Artabanus was taken prisoner and killed (A.D. 226). This ended the kingdom of the Arsacidæ, which had existed about 475 years.

AR'TABA'ZUS (Gk. *'Αρτάβαζος*, *Artabazos*). The name of several distinguished Persians in the times of the Achæmenidæ. When Xerxes advanced against Greece, it was an Artabazus who led the Parthians and Chorasmians. He later warned Mardonius against engaging in battle at Platæa, and on the first indications of defeat he withdrew his own division, amounting to 40,000, from the field, and succeeded, though with great difficulty, in forcing his way through the wilds of Thessaly, Macedonia, and Thrace to Byzantium, where he crossed to Asia. Subsequently he acted as negotiator between the Spartan Pausanias and Xerxes. Another Artabazus was general under the Persian King Artaxerxes Mnemon, and revolted against Artaxerxes Ochus in B.C. 356. For this offense he appears to have been forgiven, and subsequently we find him accompanying Darius Codomannus after the battle of Arbela. On the murder of the King, Artabazus attached himself to Alexander, who rewarded his fidelity by appointing him satrap of Bactria.

ARTAGNAN, D', där'tá'nyäɴ'. The hero of Dumas's *Trois mousquetaires*, *Vingt ans après*, and *Le Vicomte de Bragelonne*. He is chiefly known in modern times as a well-drawn character in these novels; and the Gascon adventurer who goes to Paris to seek his fortune, winning his way by his sword, his genius for intrigue, and the aid of his three friends, Athos, Porthos, and Aramis, is among the most popular heroes of fiction, both on and off the stage. But he was also an actual historical personage of note. Charles de Baatz de Castelmore, Count d'Artagnan, was born in 1611 or 1612. By 1654 he had risen to be captain in the Guards. When the musketeers were reëstablished in 1657, he was made *sous-lieutenant;* but as the nominal head of the corps, the Duke de Nevers, paid no heed to his duties, he was practically its commander-in-chief, becoming actual *capitaine-lieutenant* in 1667. His most noteworthy official act was the arrest of the all-powerful minister, Fouquet, in 1661. He was made *maréchal-de-camp* (brigadier-general) in 1672, and fell in June of the following year at the siege of Maestricht.

ARTAN'THE. See MATICO.

AR'TAPHER'NES (Gk. 'Αρταφέρνης). A Persian general, who, with Datis, commanded the Persian army that invaded Greece (B.C. 490) and was defeated at Marathon (q.v.). He led the Lydians and Mysians in the expedition of Xerxes against Greece in B.C. 480.

ARTAX'ATA (Gk. 'Αρτάξατα, Armen. *Artašat*). The ancient capital of Armenia, on the Araxes, where Hannibal took refuge when Antiochus could no longer protect him. The Carthaginian is said to have superintended the building of the city, which was named from the King Artaxais I. about B.C. 180, on the site of an older city, Armavir. It was destroyed by the Romans (A.D. 58), rebuilt by Tiridates, and called Neronia, in honor of Nero, who had granted the kingdom to Tiridates. It was taken and partly destroyed by the Persians in 370, and in 450 it was the seat of an ecclesiastical council, over which Joseph, the patriarch, presided. The ruins of the city are now called Ardashir.

AR'TAXERX'ES (Gk. 'Αρταξέρξης, Old Pers. *Artaxšaϑra*, "whose kingdom (*xšaϑra*) is right (*arta*)." The name of three of the ancient Persian kings of the Achæmenian dynasty (see ACHÆMENES). The same title, under its later and changed form of Artakhshatar, or Ardashir (q.v.), reappears as the name of three sovereigns of the Sassanian dynasty. See SASSANIDÆ.

The first of the ancient monarchs of the name is ARTAXERXES I., surnamed Longimanus, or Μακρόχειρ, from the Persian Dirāzdast, 'the long-handed.' Whether this designation referred to an actual physical peculiarity or to the extent of his empire is uncertain. He was the son of Xerxes, and he ruled over Persia, B.C. 465-424. The Egyptian revolt which broke out in the first part of his reign was suppressed about B.C. 455. The hostilities which existed between Persia and Greece were checked by the victory which the Hellenic arms gained over the Persian forces in Cyprus, B.C. 449, and a truce was arranged on the initiative of Artaxerxes. During his reign the Peloponnesian War in Greece broke out (B.C. 431). Artaxerxes died in March, B.C. 424, on the same day as his wife Damaspia. His name is preserved on a tablet which he caused to be inscribed in the palace at Persepolis, and it has been found also on a porphyry vase.

ARTAXERXES II., surnamed Mnemon, from his tenacious memory, was a grandson of the preceding, and was King of Persia B.C. 404-358. He is the most important of the three kings of the name; and he is best known to history because of the revolt of his brother, Cyrus the Younger, which resulted in the fateful battle of Cunaxa (B.C. 401), as described by Xenophon (q.v.) in the *Anabasis*. Artaxerxes rebuilt the royal palace at Susa, and his inscriptions mention the Zoroastrian divinities Anāhitā (see ANAÏTIS) and Mithras (q.v.), which fact is of interest in regard to the question of his faith. His life is included among Plutarch's biographies.

ARTAXERXES III., or Ochus (Old Pers. *Vahuka*), son of the preceding, and King of Persia B.C. 358-37. He was the contemporary of Philip of Macedon. Ochus was a weak and despotic ruler, enough proof of which was given by his behavior when he subdued Egypt, about B.C. 350. His policy throughout was largely guided by his shrewd and influential eunuch Bagoas, at whose hands, through poison, he ultimately lost his life.

ARTEDI, är-tā'dė, PETER (1705-35). A Swedish naturalist. He was born at Anund, Sweden, February 22, 1705, and studied at Upsala, where he and Linnæus became youthful friends. Resolving to reform the existing systems of classification, Artedi gave his attention to fishes and Linnæus to plants. He was drowned at Leyden, September 21, 1735. At the time of his death he left materials for his *Ichthyologica*, which Linnæus edited and published, together with a life of the author, in 1738. A new edition appeared in 1788, and a part of it was expanded and reissued, edited by Schneider, in 1789, under the title *Synonomia Piscium*. According to Cuvier, the great work of Artedi is the first named, which gave a truly scientific character to the study of fishes. The only error of any magnitude which occurs in it is the inclusion of the Cetacea among fishes. Artedi was also a distinguished botanist. He was the first to indicate, as a special characteristic, the presence or absence of involucra in the umbelliferous plants, whose species are so difficult to distinguish from each other. Linnæus named a genus of these, in memory of his friend, *Artedia*.

AR'TEGAL. The personification of justice in the *Faerie Queene*. The character is also supposed to represent Lord Grey, Spenser's patron.

ARTEL, är-tyĕl′. The Russian name for a *gang*. It refers especially to associations of independent laborers working collectively on a job and dividing the profits. It is a primitive form of coöperative production, which sometimes resembles the old trade guild and is still in existence among the fishermen of Archangel. Among the peasants in agricultural labor the artel has been largely displaced by the contract system, though they are still organized on the coöperative basis sometimes for the purchase of provisions. See Gangs, Agricultural.

AR′TEMIDO′RUS (Gk. *'Αρτεμίδωρος*, *Artemidōros*). A geographer and native of Ephesus, who lived about B.C. 100. On one occasion he was sent to Rome to recover from the Government certain treasures which had been wrongfully appropriated by the Roman officials. In recognition of his success on this embassy, his townsmen erected a golden statue to him. His travels extended through the lands bordering on the Mediterranean Sea and the less distant parts of the Atlantic Ocean and the Red Sea. The Γεωγραφούμενα, *Geographoumena*, in eleven books, was a comprehensive work on the geographical, physical, historical, and political features of the most important countries of Europe, Asia, and Africa, and was based on the author's own investigations and a study of the works of Timosthenes, Eratosthenes, Polybius, Agatharchides, and others. It was much used by later authors, but only fragments have come down to us. An epitome of the work was made by Marcianus of Heraclea, which also is not extant. Artemidorus wrote another book called 'Ιωνικὰ ὑπομνήματα, *Ionika hypomnēmata*.

AR′TEMIS. See Diana.

ARTEMISA, är′tȧ-mē′sȧ, or **ARTAMISA**, är′tȧ-mē′sȧ. A town of Cuba, in the Province of Havana, situated about 35 miles by rail from Havana (Map: Cuba, C 4). It carries on a considerable trade in sugar and tobacco. Population, in 1899, of district, 9317.

ARTEMISIA, är′tē-mĭzh′ĭ-ȧ *or* -mĭsh′ĭ-ȧ (Lat., Gk. *'Αρτεμισία*, probably from being dedicated to Artemis). A genus of plants of the order Compositæ, in which the flowers of the disk have stamens and styles and are either fertile or abortive, those of the ray pistillate and fertile. The heads of the flowers are numerous and small; the leaves are generally much divided. There are many species, herbaceous plants and shrubs, natives chiefly of the more temperate regions of the eastern hemisphere and the western United States. They have generally an aromatic smell, more or less agreeable, and a warm, sometimes rather acrid and bitterish taste. To this genus belongs Wormwood (*Artemisia absinthium*), the *apsinthion* of the ancient Greeks, to whom its medicinal properties were well known. It is a native of Great Britain, the Continent of Europe, and the northern parts of Asia, and it grows in waste places by waysides, etc. It is a perennial, two to four feet high; its leaves are bipinnatifid and clothed with a silky down, and its small, hemispherical drooping heads of flowers are of a dingy yellow color and are produced in axillary panicles. It is aromatic and bitter, containing a bitter principle and an essential oil, both of great strength, on account of which it is used in medicine in various forms (oil, extract, tincture, etc.), as a stomachic and anthelmintic or vermifuge. It was formerly in much use as a febrifuge. Sea Wormwood (*Artemisia maritima*, including a variety which has been called *Artemisia gallica*), a native of salt-marshes in Great Britain and other parts of Europe, possesses similar properties, and is occasionally used for the same purposes; as also Roman Wormwood (*Artemisia pontica*), a native of the middle and south of Europe, but not of Great Britain; Tartarian Wormwood (*Artemisia santonica*), a native of Tartary, Persia, and other parts of the East; and Indian Wormwood (*Artemisia vulgaris*), a native of the Himalaya, abounding at elevations of 2000 to 6000 feet. Indian wormwood grows to the height of twelve feet. It is considered in India a powerful deobstruent and antispasmodic. Tree Wormwood (*Artemisia arborescens*), a native of the south of Europe and the Levant, is also larger and more shrubby than the common wormwood, which, in characters and qualities it resembles. The dried flower-buds of a number of species of Artemisia are sold under the names of Wormseed and have long been in much repute as anthelmintics. *Artemisia santonica*, which is said to contain as much as 2 per cent. of santonin is one of the best known. The plants from which the bitter aromatic liquor called *extrait*, *eau*, or *crême d'absinthe* is prepared, are small, low-growing species of Artemisia (*Artemisia mutellina*, *Artemisia glacialis*, *Artemisia rupestris*, *Artemisia spicata*, etc.), found on the Alps, and known to the inhabitants of the Alps by the name of *genipi*. Mugwort (*Artemisia vulgaris*), a common native of Great Britain and of the Continent of Europe, often found about ruins and in waste places, grows to the height of three or four feet, with pinnatifid leaves and with panicles of small yellow flowers. It emits, when rubbed, an agreeable smell, and has a bitter taste. In Germany, the young shoots and leaves are used in cookery for seasoning. It is used also for the same medicinal purposes as wormwood, but is weaker. Its leaves, and those of some of the other species, are used as fomentations for cleansing and healing wounds. Southernwood (*Artemisia abrotanum*) is a shrubby plant with long, straight stems 3 to 4 feet high, the lower leaves bipinnate, upper leaves pinnate. It is a native of the south of Europe and middle parts of Asia, and has long been a favorite plant in cottage-gardens in Great Britain. It has an aromatic and pleasant odor. The leaves are used to drive away moths from linen, and in some parts of the Continent of Europe as an ingredient in the manufacture of beer. The smell of this plant appears to be peculiarly disagreeable to bees, which retreat from it; and a little branch of southernwood is sometimes efficaciously used when they are swarming, to promote their ascent into the new hive placed over them. Tarragon (*Artemisia dracunculus*) is a perennial plant, a native of Siberia, and long cultivated in gardens in Great Britain. It has a branching stem one to one and a half feet high, with narrow leaves. It is fragrant, and has an aromatic smell and taste. The leaves and tender tips are a favorite ingredient in pickles. An infusion of the plant in vinegar is used as a fish-sauce. The leaves of *Artemisia maderaspatana* or *Grangea maderaspatana* are regarded in India as a valuable stomachic, and are also used in anodyne fomentations. Moxa (q.v.) is prepared by the Chinese from the leaves of *Artemisia moxa* and other species, the whole surface of whose leaves is covered with a thick down. In the western United States many shrubby species exist and are known as 'sage brush.' One of the most common is *Artemisia tridentata*, with small, wedge-shaped leaves, three to seven-notched. These plants are important forage for cattle and sheep, especially the latter. See ABSINTHE.

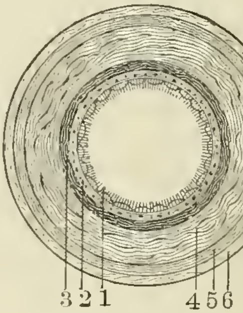
ARTEMISIA (Gk. Ἀρτεμισία) (c. 350 B.C.). A queen of Caria. She was the wife of Mausolus, and is celebrated for the magnificent monument which she caused to be erected to her husband's memory. (See MAUSOLEUM.) Another Artemisia, a queen of Halicarnassus in Caria, and a vassal of the Persian King, joined the fleet of Xerxes in the expedition against Greece, and distinguished herself by bravery and skill at the battle of Salamis (B.C. 480). The Athenians, indignant that a woman should appear in arms against them, offered a reward of 10,000 drachmæ for her capture, but she escaped. According to a doubtful tradition, Artemisia afterwards jumped from the Leucadian Rock, in consequence of a disappointment in love.

ARTEMISIUM, är′tė-mĭsh′ĭ-ŭm (Gk. Ἀρτεμίσιον, *Artemision*).—(1) The stretch of coast at the northern extremity of Eubœa, opposite the Thessalian Magnesia. It belonged to the town of Histiæa, and was named from the temple of Artemis, which stood here. Off this point occurred the first naval conflict between the Greeks and the Persians at the time of the invasion of Xerxes.—(2) A mountain between Argolis and Arcadia, now called Malewo. On the summit was a temple of Artemis.—(3) A promontory and temple of Artemis in Caria.

AR′TERIES, DISEASES OF. See ARTERY.

ARTE′RIO-SCLERO′SIS (Gk. ἀρτηρία, *artēria*, artery + σκλήρωσις, *sklērōsis*, induration). A disease of the arteries, resulting in hardening of the muscular elastic coat. The connective tissue of the walls is increased in quantity. This produces a contraction, by pressure, on the blood-vessels supplying the artery, which in turn causes weakening and degeneration of the walls of the vessel. It loses its elasticity, becomes hard and rigid, and is easily ruptured. If the degeneration takes place in spots or mainly involves one of the arterial coats, with the production of fatty degeneration and subsequent deposit of lime salts in the walls of the vessel, it is termed *atheromatous*, from atheroma (Greek *athērē*, meal), the name of the fatty or chalky substance. At times the increase in the amount of connective tissue is so great that the lumen of the blood vessels is obliterated. The causes of arterio-sclerosis are chronic alcoholism, gout, lead-poisoning, syphilis, deficient metabolism from habitual overeating, overwork of the heart, and kidney diseases. See ARTERY.

AR′TERY (Lat. *arteria*, Gk. ἀρτηρία, *artēria*, wind-pipe, artery). An anatomical term designating any one of the vessels through which the blood passes from the left side of the heart to the tissues, named from the old idea that these tubes were air-carriers because they are empty after death. The structure of an arterial tube is very complex, and a section of it may be roughly subdivided into three layers, called the coats of the artery: an external, which is elastic and distensible, the *tunica adventitia;* a middle, which is muscular, contractile, and brittle, the *tunica media;* an internal, also brittle, smooth, and transparent, being lined within by endothelium, the *tunica intima*. The tube is also enveloped in cellular tissue, termed the *sheath* of the artery. When an artery is wounded by a sharp instrument, the effect varies with the direction of the cut. Thus, if longitudinal, the edges may not separate, and the wound may heal without much bleeding; if oblique or transverse the edges gape, and a nearly circular orifice allows of a profuse hemorrhage. If the artery be completely divided, its walls do not collapse like those of a vein, but pass through certain changes provided by nature to limit hemorrhage. The cut orifice contracts, and also retracts into its cellular sheath; this checks the flow of blood, a clot of which shortly forms on the outer side; then another forms inside the vessel, and together they stem the flow till the cut edges of the artery have time to throw out lymph (see ADHESION), and heal as wounds of other tissues. When an artery is compressed by a ligature, the brittle inner and middle coats crack, curl inwards, and unite. See BLEEDING.



SUBDIVISIONS OF ARTERIAL WALLS.

1. Endothelial layer.
2. Fenestrated membrane.
3. Muscular layer.
4. Elastic layer.
5. Fibro-connective layer.
6. Areolar sheath.

The arteries of the human body are all offsets, more or less direct, of the aorta. As each main trunk passes into a portion of the body, it divides into two principal divisions: one, which breaks up into branches for the supply of the tissues in the vicinity—the artery of *supply;* and another, which passes almost branchless to supply the parts beyond—the artery of *transmission*. These, however, anastomose freely, so that the distant tissues are not solely dependent for their supply on only one arterial trunk. Thus, the femoral artery divides in the groin into the profunda, or *deep* femoral, to supply the thigh, and the *superficial* femoral, to supply the leg below the knee. Again, the common carotid divides into *external* carotid, to supply the neck and head, and the *internal* carotid to supply the brain. Although arteries have generally the same distribution or arrangement of branches, they occasionally vary, and may in this way be misleading to the student or the surgeon. Comparative anatomy goes far to explain these apparent discrepancies in arterial distribution.

Diseases of the Arteries. The diseased conditions affecting arteries consist of (1) degeneration of the arterial walls (of either fatty, calcareous, or hyaline variety); (2) arterio-sclerosis; and (3) aneurism. *Fatty degeneration* of the *intima* (or inner coat of an artery) is very common. It occurs as yellowish spots in the aorta and larger vessels. *Calcareous degeneration* succeeds the fatty change, and occurs as flakes or plates of chalky deposit in the *intima*. It is the terminal stage of arterio-sclerosis. *Hyaline degeneration* is a change usually found at the beginning of arterio-sclerosis. It occurs as a smooth, homogeneous substance replacing the *tunica intima*, generally distributed throughout the smaller arteries and capillaries, especially in the kidney. The substance which replaces the normal tissue of the arterial coat is called *atheroma* (from Greek *athērē*, meal), whether hyaline, fatty, or calcareous: it consists of a pulpy or hardened mass of cholestrine, oil, albuminous and chalky material. In some arteries, such as those over the temples and at the wrists, chalky deposits or atheromatous thickening may be felt easily. Atheromatous deposit is at first attended with a narrowing of the calibre of the vessel, varying with the thickness of the deposit, and most marked at the points of bifurcation. Smaller arteries may be completely obliterated, while the larger arteries may be very much contracted. A later consequence is dilatation of the vessel. The power of the outer coats being insufficient to compress the deposit and to close in upon the blood, with which each contraction of the left ventricle of the heart distends them, they remain wide and distended during the relaxation of the ventricle, and the artery thus slowly expands; the enlargement being most marked at parts where there is most obstruction to the blood-current—as, for example, in curved arteries. These dilatations are apt to terminate in regular aneurism. The arteries sometimes become abnormally lengthened, and consequently become not only dilated, but also tortuous. Another condition involving much danger is this: an ossified artery loses the smoothness which the interior of the vessel ought to present, and from the displacement or cracking of a bony plate, there may be sharp, rough projections exposed, to which the fibrin of the circulating blood may adhere. These little clots, becoming detached, may be carried with the blood till they become arrested, and plug up an artery, thus presenting cases of embolism or thrombosis (q.v.). A blow may crush a diseased artery, when a healthy elastic vessel might have escaped injury. A ligature applied to any ossified artery is very apt to cause it to break, and the difficulty of securing such vessels is often very great. It is to this form of disease that most of the failures of operations for aneurism are due. The heart's action in pumping blood through stiff, unyielding arteries whose calibre is diminished causes a permanent rise in the blood pressure, resulting in hypertrophy of the heart, disease of the kidneys, cerebral hemorrhage, aneurism, gangrene or sclerosis of the coronary arteries. The treatment of disease of the arteries consists in removing the cause when possible, maintaining a quiet, well-regulated life, and the adherence to hygienic rules. *Arteritis*, or *inflammation of the arteries*, is no longer recognized by physicians as a specific general disease. See Arterio-Sclerosis; Heart; Kidneys; Apoplexy; Aneurism; and Gangrene.

ARTESIAN (ăr-tē′zh*a*n) **WELLS** (from the old county of *Artois*, Lat. *Artesia*, now part of France, where the oldest well in Europe was bored in 1126). Vertical borings into the ground, to a depth of 100 feet or more for the purpose of obtaining water from some deeply buried porous stratum, such as sandstone or gravel. In the true artesian well the water should flow to the surface, but at present the term artesian is applied to any deep well, even where the water is obtained by pumping.

The presence of an artesian water supply in any region depends upon the existence beneath that region of a tilted porous layer, inclosed between two impervious beds. The outcropping edge of the porous bed must, moreover, be of sufficiently open texture to soak up the rain which falls upon it, and furthermore there must be no escape of the contained water from the lower portions of the bed. It is therefore evident that when such a porous stratum is saturated with water, the latter will be under pressure, the pressure at any one point amounting to that of a column of water whose height is the difference between the altitude of that point and the altitude of the outcrop of the water-bearing layer. If now from a point on the surface, at a level lower than that of the outcrop of the porous stratum, a drill hole be sunk to the water-bearing bed, a flow of water will be obtained, but the water will seldom rise to the same level as the point of intake owing to the friction which has to be overcome in flowing through the porous bed. The most favorable conditions are when the rocks form a basin, or when the inclined porous layer passes into an impervious one. The collecting area, or region drained by the porous stratum may be in the immediate vicinity of the well (a common case in shallow wells) or it may be at a distance of several hundred miles. In boring for artesian water a knowledge of the geological structure of the region is of highest importance. The work of the United States Geological Survey, aided by data contained from wells already bored, has demonstrated the existence of several extensive and well-marked artesian water-yielding areas. Thus a large part of Nebraska, South Dakota, eastern Colorado, and northwestern Kansas, obtains its artesian water from the Dakota sandstone, the collecting area of which is around the base of the Black Hills in South Dakota and along the eastern foothills of the Rocky Mountains. The Iowa wells derive their water from the Saint Peters sandstone, whose collecting area is in Wisconsin. Along the Atlantic coast, many wells obtain a supply of pure water from the southeasterly dipping Tertiary and Cretaceous beds underlying that area.

Artesian wells in all parts of the country yield a supply of water for domestic use, which in many instances is much purer than surface water. In the arid regions of the West they also serve the purpose of supplying water for irrigation, thus rendering fertile the soil of many districts heretofore non-productive.

The Chinese were acquainted with artesian wells, and in Europe they have been used for centuries—in France, England, Austria, and Germany; indeed, the basin-shaped structure of the Paris and London areas, with their alternating beds of clay and sand, has yielded the type structures for artesian water supply. Portions of the Sahara Desert have been reclaimed by artesian water derived from wells sunk by the French Government. The effect of these wells has been materially to benefit the country, and also to change the character and habits of its nomadic Arab inhabitants. Several tribes are said to have settled down around these artificial springs, and, thus forming the centres of settlements, to have constructed villages, planted palms, and to have entirely renounced their previous wandering existence.

Many artesian wells have been driven to a great depth, their diameters varying from three to six inches, several such deep borings having been made in the United States; e.g., at Saint Louis, Mo. (3843.5 feet); Columbus, Ohio (2775⅓ feet); Louisville, Ky. (2086 feet); Charleston, S. C. (1250 feet); Galveston, Tex. (3071 feet); Pittsburg, Pa. (4625 feet). At Wheeling, W. Va., there is a dry well 4500 feet in depth, which has furnished valuable records of temperature changes in the earth's crust. Among the noted foreign wells is one at Passy, near Paris, 1923 feet deep: Sperenberg, near Berlin, 4194 feet; Schladenbach, near Leipzig, 5735 feet.

The temperature of artesian well waters is commonly about 40° to 50° F., except in the case of deeper wells, whose waters may reach a temperature of 70° to 80°. In some places these hot waters are used for heating buildings, as at Grenelle, Paris. The Grenelle well-water has a surface temperature of 81.70° F.

Cases are not infrequent where artesian waters are charged with gases such as carbon dioxide, or hydrogen sulphide; or they may contain mineral substances in solution, thus at times serving as medicinal waters.

The methods adopted for boring artesian wells are similar to those employed in drilling oil wells. (See Well Sinking.) The cost is commonly from $2 to $3 per foot for the first 1000 feet, and 50 cents greater per foot for each additional 500 feet. Artesian wells commonly show a gradual decrease in flow, due either to partial filling of the tube, or to reduction of pressure because of the boring of new wells in the same vicinity, or to exhaustion of the basin. More precise information regarding the distribution and characteristics of the artesian waters of different portions of the United States may be found in the bulletins and annual reports of the United States Geological Survey and of the geological surveys of various States, particularly those of Iowa, New Jersey, Mississippi, and Missouri.

ARTEVELDE, är'te-vĕl'de, Jacob or James van (c.1290-1345). A popular leader of the Flemings. At the opening of the Hundred Years' War, he was a member of the Weavers' Guild of Ghent. The war between England and France having threatened the cloth industry of Flanders, Artevelde was persuaded to lead the Flemings against the encroachments of Count Louis of Flanders, the vassal of the French King. In December, 1337, he assumed the leadership, and, with the aid of the men of Ghent, freed the town from the nobles and adherents of the Count. Afterwards Artevelde was elected captain-general of the town of Ghent. In 1338 he made a commercial treaty with England, but maintained the policy of armed neutrality. Edward III. of England, wishing to gain him as an ally, landed at Sluys, but was resisted. Edward's first campaign proving unsuccessful, Philip of Flanders refused to recognize the neutrality of the Flemings, thus forcing them to declare for the English. Artevelde now urged Edward to assume the title of 'King of France,' and the Flemings, in 1340, accepted Edward as their liege lord. The chief power remained in the hands of Artevelde. On July 24, 1345, he was slain in a popular tumult at Ghent, presumably because he intended to recognize the Black Prince as Count of Flanders.

Artevelde, Philip van, son of Jacob, born 1340, entered public life in January, 1382. Differences had again arisen between the Flemings and Count Louis. Under Yoens, the former burned the Count's favorite castle and set up the standard of revolt. Yoens dying the same year, Peter van den Bossche became leader; but, as affairs seemed to be going badly for the revolt, Artevelde was chosen chief captain. By severe discipline and skillful tactics he defeated the Count's forces and entered Bruges; but, in November, Charles VI. brought a great army from France. Artevelde took his stand at Roosebeke, but was defeated and slain, November 27, 1382.

Sir Henry Taylor published a drama entitled *Philip van Artevelde* (London, 1834). Consult: Ashley, *James and Philip van Artevelde* (London, 1883); and Hutton, *James van Artevelde* (London, 1882).

ART'FUL DODG'ER, The. The nickname of John Dawkins, one of the band of youthful pickpockets maintained by Fagin the Jew, in Dickens's *Oliver Twist*.

ARTHOIS, är'twä', Jacques d' (1613-c.83). A landscape painter of the Flemish School. His pictures, the subjects of which are derived principally from the forests and environs of Brussels, are characterized by great facility of execution, but lack that close fidelity to nature peculiar to the best productions of his contemporaries, Teniers, Pierre Bout, and Van der Meulen. His paintings are numerous, the best being preserved in the galleries at Madrid, Brussels, and Vienna.

ARTHRI'TIS (Gk. *ἀρθρῖτις*, joint-disease, gout, from *ἄρθρον*, *arthron*, a joint). An inflammation of the joints, arising from wounds, bruises, or surgical operations, and sometimes without apparent cause. It frequently follows a bacterial infection. All, or a part, of the joint may be involved. The main symptoms are swelling, pain, heat, and redness. At times the pain is very intense. The usual treatment is compression by cloths wet with cold water, rest, cooling diet, and sedatives. Counter-irritation by means of iodine, turpentine, or mustard, may be of service. In some cases cupping or leeching may be proper. See Gout; Synovitis.

ARTHROP'ODA (Gk. *ἄρθρον*, *arthron*, a joint + *πούς*, *pous*, foot). One of the phyla of animals. They are bilaterally symmetrical, and the body is divided into segments, of which each typically carries a pair of jointed appendages. The brain lies dorsal to the food canal, and is connected with a ventral chain of ganglia. The body is covered with a fine chitinous cuticle, periodically molted. The Arthropoda are descended from the Annulata, from which they differ chiefly in the jointed appendages, which are used largely as walking, instead of merely swimming, appendages, and they have advanced beyond the annelids in the specialization of the segments and appendages, so that in general, head, thorax, and abdomen may be distinguished. The head always bears a pair of jaws and at least one pair of antennæ, except when, as in spiders, these are rudimentary or altogether gone. The abdomen is usually devoid of developed appendages; when present, these have other functions than locomotion. Sense organs are usually well developed, except in the parasitic forms. The eyes are either simple and placed directly above the brain, or compound, and are sometimes placed on movable stalks. The mouth is usually provided with one or more pairs of appendages; the intestine may be coiled, and excretory organs occur chiefly either as specialized tracts or as diverticula of the midgut, or as tubular special glands. An incomplete blood system is present, but veins are often lacking, and the blood returns through the general body spaces. The dorsal vessel functions as a heart, and may become very short and specialized. Reproduction is usually bisexual, but parthenogenesis occurs. During development repeated moltings (ecdyses) occur, often associated with profound changes in form; from molt to molt constitutes a larval 'stage.'

Classification. Class I. *Crustacea*, divided into *Entomostraca*, of small size and a variable number of segments, and *Malacostraca*, usually of large size, with twenty segments in the trunk (excepting one small and rare group, Nebalia). Orders of Entomostraca: Phyllopoda (fairy-shrimps), Trilobita (fossil), Ostracoda, Copepoda (water-fleas), Cirripedia (barnacles). Chief orders of Malacostraca: Isopoda (sow-bugs), Amphipoda (beach-fleas), Cumacea, Stomatopoda (mantis shrimps), Schizopoda (shrimps and prawns), Decapoda (lobsters, crayfish, crabs).

Class II. *Arachnida*—Orders: Scorpionida (scorpions); Pseudoscorpionida (book scorpions); Pedipalpida (scorpion spiders); Solpugida (Galeodes); Phalangida (harvestmen); Araneida (spiders); Acarida (ticks and mites); Xiphosura (king crab).

Class III. *Onychophora*, containing only Peripatus.

Class IV. *Myriapoda* (Centipeds, etc.).

Class V. *Insecta*—Orders: Aptera (springtails and silver-fish); Orthoptera (cockroaches, grasshoppers, etc.); Neuroptera (dragon-flies, May-flies, caddis-flies, etc.); Hemiptera (bugs); Diptera (gnats and flies); Lepidoptera (butterflies and moths); Coleoptera (beetles); Hymenoptera (bees, wasps, etc.).

Bibliography. References to books will be found under various articles describing groups or species of Arthropoda. Consult as general works, particularly the series "Cambridge Natural History," and Parker and Haswell, *Text-book of Zoölogy* (London and New York, 1897); Lankester, Hutton, and others, "Are the Arthropoda a Natural Group?" in *Natural Science*, Vol. XI. (London, 1897); Kingsley, "Classification of the Arthropoda," in *American Naturalist*, Vol. XXVIII. (Philadelphia, 1894).

AR'THUR, Prince, Duke of Connaught. See Connaught, Arthur William Patrick Albert, Duke of.

ARTHUR. A half-legendary king of the Britons, supposed to have reigned in the Sixth Century. He was the great national hero of the British Celts, and became the central figure of one of the principal cycles of mediæval romance. Nothing is absolutely known of his history, and his existence has sometimes been denied altogether. The more usual view, however, recognizes at least an historic starting-point for the great body of tradition that centres in his name. In accordance with a favorite theory of modern mythologists, Arthur is often regarded as a combination of an actual British hero with one or more ancient Celtic gods. Thus, Professor Rhys, who connects Arthur's name with an Aryan root which means 'to plough,' thinks that some elements in his legend belonged originally to a culture-god described on Continental inscriptions as Mercurius Artaois, or Mercurius Cultor, while perhaps other elements were derived from an old sky-god, a kind of Celtic Zeus.

The usual account of Arthur is briefly as follows: He was the son of Uther Pendragon, King of Britain, and Igerne, the wife of the Duke of Cornwall, whose union was effected by a device of Merlin the Wizard. After the death of the Duke, Uther made Igerne his queen, and in due time Arthur succeeded to the throne. Upon becoming King, Arthur at once took the lead of his people in their wars with the Saxons, and defeated the invaders on every hand. Encouraged by victory, he extended his conquests to Ireland, the Orkneys, and even to Norway and Gaul. Meanwhile he established a great court at Cærleon-on-Usk, where, with his Queen Guinevere (or Guanhumara), he was surrounded by a grand assemblage of knights and kings. After a time a message came from the Emperor of Rome demanding tribute, and Arthur, ably supported by Gawain, conducted a successful expedition against the forces of the Empire. In the midst of his victories on the Continent Arthur was recalled to defend his kingdom and queen from the traitorous Modred, who had seized upon both in his absence. Arthur undertook to put down the rebellion, and in the first battle his forces were victorious, but Gawain was slain. Then, in the battle of Camlan, Modred was defeated and killed, but Arthur himself was grievously wounded and carried off to the Island of Avalon to be healed. The hope was long cherished by the British people that Arthur would some day return and restore them to power.

Much of this narrative is obviously unhistoric, and very little of it can be traced with certainty to sources older than the Ninth Century. The first recorded mention of Arthur is in the *Historia Britonum* of Nennius, a work which assumed its present shape about 850. He is there described as a *dux bellorum*, who, along with other leaders of the Britons, fought twelve battles against the Saxons. The *Annales Cambriæ* (probably written in the Tenth Century) also mention him, giving the year 537 as the date of his death. The *Vita Gildæ* (usually ascribed to the Twelfth Century) speaks of him as a king of all Britain. But not till we come to the *Historia Regum Britanniæ* of Geoffrey of Monmouth (written about 1136) do we find the more fully developed story of which an outline has just been given. The question with regard to Geoffrey's sources is very difficult, and may never be fully settled. The later chroniclers

—Wace, Layamon, Robert of Gloucester, and the rest—for the most part repeat the same account, with minor modifications. Thus Wace (who wrote in 1155) first mentions the Round Table, an element which he surely did not invent, but must have derived from current Celtic traditions.

It was not in the chronicles, however, that the material about Arthur found its fullest and best expression. The fame of his court was most widely celebrated in the romances of chivalry. Of this class of literature one of the earliest and greatest representatives was the French poet, Chrestien de Troyes, who wrote in the latter half of the Twelfth Century. He had many followers in France, and the French romances were widely translated and imitated in the other European languages. The relation between the romances and the chronicles is not entirely clear, but the latter cannot be looked upon as the source of any considerable part of the material in the former. In the romances, less attention is paid to Arthur and his conquests, and far more to the lives and exploits of his several knights; so that the King, while remaining the central figure of all the poems, is the hero of hardly any. Gawain, Ywain, Lancelot, and Perceval are celebrated in turn, until they, too, give place to new knights, the favorites of new poets. Most of the earlier romances (like those of Chrestien) were metrical; but the stories soon began to be worked over in prose, and finally great prose cycles were written, in which the scattered episodes were woven together with as much consistency as could be obtained. The great example in English of this stage of development is the *Morte d'Arthur* of Sir Thomas Malory, which has been the source of Arthurian lore most consulted by English readers and writers since the Fifteenth Century.

The origin of the material in the romances and the manner of its transmission has long been the subject of voluminous discussion. Some scholars have maintained that there is nothing distinctively Celtic in the cycle beyond the names, the geographical setting, and an occasional incident. Others, holding the stories to have been in large part the property of the Celtic races, have discussed whether they were transmitted to the French poets in England or on the Continent, whether through the Armoricans or through the Welsh. Each of these theories of transmission has at present its adherents among scholars; but in the course of recent investigations the Celtic character and origin of the great body of the material has been steadily made clearer. The 'matter of Britain' has not been misnamed. Unfortunately, the remains of early Welsh literature are scanty, and little or nothing can be learned from them of the direct sources of the Arthurian stories. But the national hero tales of the Irish have been preserved in large quantities from very early times, and a comparison of this saga-material with the mediæval romances has developed many striking parallelisms which cannot be explained except by some theory of common origin. The pursuit of this line of investigation has yielded most important results in the last few years.

The story of Arthur and his Round Table has been less treated in modern than in early English literature. Still, it has engaged the attention of great poets. Spenser introduced Arthur into the *Faerie Queene*, but preserved very little of the substance of the old romances. Milton and Dryden both planned Arthurian epics, and then gave them up for other subjects. The romantic revival of the Nineteenth Century brought the 'matter of Britain,' along with other mediæval subjects, once more to the front. A number of episodes from the cycle were treated by the lesser poets of the period, and Tennyson produced in the *Idylls of the King* what is now without doubt the best-known version of these ancient tales.

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ARTHUR (1187-1203). Duke of Brittany, grandson of Henry II. of England and nephew of Richard I., Cœur-de-Lion, who, in 1190, declared him heir to the English throne. He was proclaimed king by the nobles of Anjou, Touraine, and Maine, on Richard's death in 1199, although the English barons decided in favor of John, Richard's younger brother. He was knighted by Philip II. of France, and invested with Brittany and the French possessions appertaining to the English crown. In the same year, John landed in Normandy. In support of Arthur, Philip took the field against him. Soon, however, Philip's unscrupulous conduct gave offense to the Angevin friends of Arthur, and in 1200 a peace was concluded between John and Philip. In 1202 war again broke out. Poitou rose in insurrection against England, and Arthur, who had marched to besiege the castle of Mirabeau, was taken prisoner. He was removed in 1203 to Rouen, where he mysteriously disappeared—drowned in the Seine, some said, by John's own hands. The story of Arthur appears in Holinshed. Shakespeare, in *King John*, used Holinshed as a basis, but supplemented the old chronicle with imaginative details of his own. See JOHN.

ARTHUR, CHESTER ALAN (1830-86). The twenty-first President of the United States. He was born at Fairfield, Vt., October 5, 1830, of

Scotch-Irish parentage. He graduated from Union College in 1848, began the practice of law in 1853, and soon became conspicuous at the bar of New York. In the decade before the Civil War his professional reputation was assured by his share in the famous Lemmon Case, involving the validity, under certain conditions, of the Fugitive Slave Law (q.v.), and by his management of the case, which resulted in securing for colored persons equal rights with white persons in the street cars of New York. In the period of the war he served at different times as Inspector-General and as Quartermaster-General of the State of New York, and gained wide recognition for his particularly effective work in preparing the New York troops for the field. Having identified himself with the Republican Party in its early days, he obtained from President Grant in 1871 the highly desirable office of Collector of the Port of New York, and four years later his administration of the office was indorsed by a reappointment. His relations with practical politics and his attitude toward civil-service reform not tending long to maintain harmony between himself and the incoming administration, he was removed from office by President Hayes. The power of his friends, however, was such that in 1880, partly as a concession to the unsuccessful supporters of Grant, he was nominated for the Vice-Presidency, and upon his election to that office manifested an activity in senatorial politics quite unusual with vice-presidents. In the factional fight for the control of the New York patronage, he continued in alliance with Roscoe Conkling, the leader of the 'Stalwart' faction, against the 'Half Breeds.' This bitter controversy culminated in the resignations of Senators Conkling and Platt; but the situation seemed altered a few months later, when, upon the death of Garfield, Arthur succeeded to the Presidency. His administration of that office, however, was marked by a realization of its responsibilities, and by principles of procedure different from those which had earlier controlled his actions as a politician.

Those who anticipated the introduction of partisan motives into the executive policy were shown clearly to be in error, and the administration, although not brilliant, was in many respects creditable. The tariff formed the chief object of party legislation, and important Congressional action was taken with reference to the problems of polygamy in Utah, of the Chinese, of the development of the navy, and of civil-service reform. On the other hand, the 'Star-Route' frauds (q.v.) had not disappeared from notice, and the prevalent dissatisfaction with the methods and accomplishments of the Republican Party was typified in the defeat of Arthur's Secretary of the Treasury, Mr. Folger, by Grover Cleveland (q.v.) in the gubernatorial contest in New York. President Arthur was avowedly a candidate for the nomination in 1884, but was defeated by James G. Blaine (q.v.). He died in New York City, November 18, 1886. See UNITED STATES, Administration of Arthur.

ARTHUR, Sir GEORGE (1784-1854). An English colonial governor, born at Plymouth. He entered the army in 1804, served with marked distinction in several campaigns, and in 1814 was appointed Lieutenant-Governor of British Honduras. From 1823 to 1827 he was Lieutenant-Governor of Tasmania, and in the latter year was appointed Lieutenant-Governor of Upper Canada. During part of 1841 he acted as Deputy-Governor. From 1842 to 1846 he was Governor of the Presidency of Bombay, India, in which capacity he carried on the Deccan survey, quelled the Kolapur insurrection, and did much firmly to establish British sovereignty.

ARTHUR, JOSEPH CHARLES (1850—). An American botanist. He was born at Lowville, N. Y., studied at the Iowa Agricultural College and Johns Hopkins, Harvard, and Bonn universities, and from 1884 to 1887 was botanist to the New York Agricultural Experiment Station. He was appointed professor of vegetable physiology and pathology at Purdue University and botanist of the Indiana Experiment Station in 1887. With Dr. Coulter and Dr. Barnes he edited a *Handbook of Plant Dissection* (1886). He is an editor of the *Botanical Gazette*, and has published numerous papers, including *History and Biology of Pear-blight*.

ARTHUR, JULIA (1869—). The stage name of Ida Lewis, an American actress. She was born at Hamilton, Ont., May 3, 1869. At the age of fourteen she appeared on the professional stage, and then, after three seasons, went to England to study music and drama. Having returned to New York, she met with success in *The Black Masque*, and in A. M. Palmer's company as Mercedes, etc. In 1895 she appeared in London with Irving at the Lyceum, playing Rosamund in *Becket*, and other parts. Next year she accompanied Irving and Terry to America. In 1897 she brought out in New York *A Lady of Quality* on an elaborate scale; the following season she appeared as Rosalind in *As You Like It*, at Wallack's Theatre. October 24, 1899, she produced, at the Broadway Theatre, *More Than Queen*, from the French of Emile Bergerat, taking the part of Josephine Bonaparte, which obtained a great success. In March, 1900, an illness in Philadelphia led her unexpectedly to leave the stage. She is the wife of B. P. Cheney.

Consult: J. B. Clapp and E. F. Edgett, *Players of the Present* (New York, 1899); and L. C. Strang, *Famous Actresses of the Day in America* (Boston, 1899).

ARTHUR, TIMOTHY SHAY (1809-85). An American story-writer, born near Newburgh, N. Y. He wrote a great number of moral and domestic tales and sketches which formerly had much popularity. One of the most popular of his stories was *Ten Nights in a Bar-room*. He founded *Arthur's Home Magazine* in 1852. He died in Philadelphia.

ARTHUR, WILLIAM (1819-1901). A British author and clergyman, born in Ireland. He was in India for three years as a missionary; afterwards secretary of Wesleyan Church Missionary Society, and president of the British Conference, and was principal of the Wesleyan College in Belfast from 1867 to 1871. He is the author of *Personal Reminiscences of a Mission to the Mysore* (London, 1847); *The Tongue of Fire, or True Power of Christianity* (1856; 40th edition in 1885, and many reprints), and other works.

ARTHUR'S SEAT. A hill 822 feet high in the immediate vicinity of Edinburgh, Scotland, and supposed to have derived its name from King Arthur. It is a basaltic mass, analogous to those of the Palisades of the Hudson, though of lesser extent, which during Mesozoic time flowed out as lava from a fissure in Carboniferous rocks. Erosion through long time subsequent to the period of outflow has resulted in the present form of the hill, which presents on its western and southern sides steep precipices. The hill was selected in 1855 as a base for observations with a view to determining the density of the earth.

AR'TICHOKE (It. *arciciocco*, dial. *carciocco*, *carcioffo*: Sp. *alca[r]chofa*, from Ar. *al-harshaf*, *al-kharshūf*). The true French or globe artichoke, *Cynara scolymus*, is a thistle-like perennial plant, now growing wild in the south of Europe, but probably a native of Asia. The genus Cynara belongs to the natural order Compositæ and is distinguished by the bracts of the involucre being fleshy at the base, and emarginate, with a hard point, and the receptacle fringed. *Cynara scolymus* has the radical leaves 3 to 4 feet long, somewhat spiny; some of them pinnatifid, some undivided. The stem is 2 or 3 feet high, branched, with large heads of violet-colored (sometimes white) thistle-like flowers at the summits of the branches. The globe artichoke is prized as a vegetable, especially in Europe. Though long known in the United States, it has never become generally used. The thickened receptacle and scales of the involucre of the immature flower is the portion eaten. A favorite method of cooking is to boil in salted water, and serve with melted butter or a white sauce. In Europe it is also eaten raw as a salad. Several varieties are in cultivation, differing in the more or less spiny leaves, and the more or less globose form of the head. Artichokes are generally propagated by rooted slips or suckers in spring. These are planted in rows about 4 feet apart, and 2 feet apart in the row. The artichoke bed continues productive for several years. Seaweed is an excellent manure. The Jerusalem Artichoke is a different plant. Consult: "Bur or Globe Artichoke," *United States Department of Agriculture Year Book, 1899, Circular 31* (Washington, 1899); L. H. Bailey, *Cyclopædia of American Horticulture* (New York, 1900-02); G. Nicholson, *The Illustrated History of Gardening* (London, 1888); and see ARTICHOKE, JERUSALEM. For illustration, see ARAUCARIA.

ARTICHOKE, JERUSALEM (*Helianthus tuberosus*). A yellow-flowered perennial, with annual stems 6 to 10 feet high, and underground shoots, which are swollen into genuine tubers. In appearance the plant closely resembles the common sunflower. The name Jerusalem is a corruption of the Italian *girasole*, sunflower; and the name artichoke comes from the supposed similarity of flavor of the tubers to the true globe artichoke. (See preceding article.) The tuber is the edible portion of the plant. The tubers are produced in clusters of thirty to fifty, close about the thick, fleshy root. They are generally pear-shaped and similar to potatoes in appearance, but not so smooth. There are white, yellow, red, and purple varieties. The plant is propagated, as are potatoes, by means of tubers planted in rows 2½ to 3 feet apart, and 12 to 14 inches distant in the row. It grows on almost any well-drained soil and is oftentimes planted on gravelly knolls or mounds that would be too dry and poor for many other crops. The crop matures in about five months, and the tubers may be left in the ground over winter without harm; but if allowed to freeze out of the ground they spoil rapidly. Yields of 200 to 500 bushels per acre are common, and as high as 1000 or more bushels per acre have been recorded. The tubers of Jerusalem Artichokes are frequently grown as a feeding stuff. Though useful for all kinds of stock, they are generally fed to pigs, which are turned in to gather the crop themselves. Like most roots, Jerusalem Artichoke tubers are succulent—that is, have a high water content, some 78 per cent. on an average. In composition they resemble potatoes closely. Their principal nutrient is starch, of which they contain some 17 per cent. The tubers are somewhat used as food. A favorite method of cooking them is to boil in salted water until tender, and serve with a white sauce. They are also eaten raw, pickled in vinegar. In Europe alcohol has been manufactured from the tubers. The leaves and stalks of the plant have been somewhat used as coarse fodder, especially for cattle. The dry stalks are useful as fuel.

AR'TICLE (Lat. *articulus*, a little joint). A word which signifies in general a component part of a whole, complete, however, in itself. Thus, we speak of the several articles of a confession; the articles of war; a leading article, etc.

The use of article as a grammatical term arose as follows: In such a sentence as, "He found *that* (or *the*) man *that* he was looking for," the Greeks considered the defining particle as connecting the two parts of the sentence, and called it joint (Gk. *ἄρϑρον*, *arthron*, Lat. *articulus*); the name was subsequently confined to the first of the two, the other being called the relative. By some grammarians the articles are included among the adjectives.

In English there are two articles—the definite *the*, and the indefinite *a* or *an*; and other modern languages have corresponding words. But articles are not essential to language. The Latin had no articles, and the Greek, as well as the oldest Germanic language, the Mœso-Gothic, e.g., had only the definite article. The Slavic languages have no article, with the exception of the Bulgarian.

The definite articles originate uniformly in demonstrative pronouns. Eng. *the* is only a weakened form of the Anglo-Saxon demonstrative *se*. The same is the case with the Ger. *der*; and Fr. *le*, Ital. *il* and *lo*, and Sp. *el*, are all from the Lat. *ille*, 'that.' In like manner, *an* or *a* is from the old form of *one* (ān); Ger. *ein* is both *one* and *a*; and so are Fr. *un*, Ital. and Sp. *uno*, both from Lat. *unus* = *one*.

In the Scandinavian tongues the definite article is attached to the end of the word: the Danish, for example, writes *kong-en*, the king; *hus-et*, the house. It is likewise appended to the noun in the Ruman (Wallachian), Bulgarian, and Albanian languages.

ARTICLES, THE SIX. Articles often mentioned in the ecclesiastical history of England in the Sixteenth Century, and imposed by act of Parliament in 1539, when Henry VIII. being displeased with some of the bishops most favorable to the Reformation, their opponents for a time regained the ascendency. These articles asserted the doctrine of transubstantiation, declared communion in both kinds not to be necessary, condemned the marriage of priests, enjoined the continued observance of vows of chastity, and sanctioned private masses and auricular confession. Severe penalties were appointed for writing or speaking against them, and for abstaining from confession or the sacrament at the accustomed times, for priests failing to put away their wives, and for persons writing or speaking against the doctrine of transubstantiation. Archbishop Cranmer vainly opposed the act in the House of Lords: the King was resolute to have it passed. Its severity was mitigated by a subsequent act of his reign (1544), and it was transgressed with impunity even by ecclesiastical dignitaries, until it was repealed in the first year of Edward VI. The text of The Six Articles Act is given in Gee, *Documents Illustrative of the History of the English Church* (London, 1896).

ARTICLES, The Thirty-nine. The articles of religion agreed upon by the archbishops and bishops of both provinces and the whole clergy of the Church of England, in the convocation held at London in the fourth year of Elizabeth, 1562, under Archbishop Parker. To have a clear view of the history of these important articles, we must go back to the promulgation of the original ones, 42 in number, in the reign of Edward VI. The council appointed by the will of Henry VIII. to conduct the government during the King's minority, was for the most part favorably disposed toward the reformed opinions, and the management of Church affairs devolved almost entirely upon Archbishop Cranmer. In the year 1549 an act of Parliament was passed, empowering the King to appoint a commission of 32 persons to revise the ecclesiastical laws. Under this act a commission of 8 bishops, 8 divines, 8 civilians, and 8 lawyers (among whom were Cranmer, Ridley, Hooper, Coverdale, Scory, Peter Martyr, and Justice Hales) was appointed in 1551, and one of its first acts was to draw up a code of articles of faith. These were 42 in number, and were set forth by the King's authority in 1553. Strype and Burnet make it appear that these 42 articles were agreed upon in the convocation that was sitting in 1552, but this was not the case. To these articles was prefixed the catechism, and there is no doubt of Cranmer having had the principal hand in their composition; for he owned before Queen Mary's commission that they were his doing. But immediately after their publication Edward died, and one of the first acts of the convocation summoned with the Parliament in the first year of Queen Mary was to declare that these 42 articles had not been set forth by the agreement of that house, and that they did not agree thereto. In 1558 Elizabeth succeeded her sister. In 1559 Parker was installed in the See of Canterbury, and immediately the other vacant sees were filled. And now came a fresh opportunity of drawing up some articles of faith which might serve as a test of orthodoxy in the Reformed Church. Parker applied himself to this work, and, for the purpose, revised the 42 articles of King Edward, rejecting 4 of them entirely, and introducing 4 new ones, viz., the 5th, 12th, 29th, and 30th as they now stand, and altering more or less 17 others.

This draft Parker laid before the convocation which met in 1562, where further alterations were made; and the 39th, 40th, and 42d of King Edward's, which treated of the resurrection, the intermediate state, and the doctrine of the final salvation of all men, were finally rejected. The 41st of King Edward's, which condemned the Millenarians, was one of the four which Parker omitted. Thus the articles were reduced to 39. They were drawn up and ratified in Latin, but when they were printed, as was done both in Latin and English, the 29th was omitted, and so the number was further reduced to 38. From these 38 there was a further omission, viz., of the first half of the 20th article, which declares that "the Church hath power to decree rites and ceremonies, and hath authority in controversies of faith." As all the records of convocation perished in the great fire of 1666, it is very difficult to ascertain how these omissions arose. However, in 1571, the articles once more underwent revision. Archbishop Parker and Bishop Jewell made a few trifling alterations; and the 29th being restored, the convocation, which was then sitting, ratified them both in Latin and in English, and an act of Parliament was passed in that year compelling the clergy to subscribe "such of them as only concern the confession of the true Christian faith, and the doctrine of the Sacraments." There still, however, remained some difficulty as to which was the authorized copy, some of the copies being printed with, and others without, the disputed clause of the 20th; but this was finally settled by the canons passed in the convocation of 1604, which left the articles as they now stand. "His Majesty's declaration," which precedes them, and directs that they shall be interpreted "in their literal and grammatical sense," was prefixed by Charles I. in 1628.

It may be interesting to know from what other sources the Thirty-nine Articles are derived. Some of them, as the 1st, 2d, 25th, and 31st, agree not only in their doctrine, but in most of their wording with the Confession of Augsburg. The 9th and 16th are clearly due to the same source. And others, such as the 19th, 20th, 25th, and 34th, resemble, both in doctrine and verbally, certain articles drawn up by a commission appointed by Henry VIII. and annotated by the King's own hand. The 11th article, on Justification, is ascribed to Cranmer, but the latter part of it existed only in the articles of 1552. The 17th, on Predestination, may be traced to the writings of Luther and Melanchthon. The fact is that they bear every mark of being a compromise, designed to be agreeable to the contending parties, Lutheran as well as Calvinist, in the Church of England at the time; and it is well to remember that they are not a creed, but a formula intended to test the sufficient loyalty of the clergy and other office-holders. Each party in the Church of England, even to the most advanced High Churchmen of the present day, has been able to prove its agreement with the teaching of the articles—to its own satisfaction, at least. Controversy as to the sense in which subscription is made to them was vigorous all through the Nineteenth Century, the acute dialectic minds of a Newman on one side and a Jowett on the other having been exercised in proving that they might be signed in a sense other than the *animus imponentis*, or the mind of the authority which requires subscription. It was felt that subscription to a body of doctrinal statements was an excessive obligation, if it were meant to imply literal agreement with every sentence. To avoid further ambiguities, and to relieve clerical consciences on this point, the Clerical Subscription Act of 1866 did away with subscription in the case of the clergy, and substituted a declaration of assent to the Articles and Prayer Book. The University Test Act of 1871 released members of Oxford, Cambridge, and Durham universities (except divinity students and holders of offices with clerical functions) from the obligation of signing them, and threw open the doors of these institutions to persons of varying religious beliefs.

They were adopted by the Convocation of the Irish Church in 1635, and by the Scottish Episcopal Church in 1804. After the organization of the American Episcopal Church they were adopted by the General Convention of 1801, with a few slight changes covering references to civil affairs, to the Athanasian Creed, which that body dropped from the Prayer Book, and to the Book of Homilies. That they are not, in their original form, satisfactory to extreme Protestants is shown by the fact that the Reformed Episcopal Church modified a number of them into a more unmistakably anti-Roman sense in 1875, and that Wesley modified and shortened them into 25 for the Methodist Episcopal Church in America in 1784. Consult: Browne, *Exposition of the Thirty-nine Articles* (London, 1850); Forbes, *An Explanation of the Thirty-nine Articles* (London, 1867).

ARTICLES OF ASSO'CIA'TION. A written instrument, setting forth the purposes, terms, and conditions of the association of several persons for the prosecution of a joint enterprise. It is primarily a contract, binding the parties thereto, severally, to one another for its performance; but it may, when duly executed and filed, have by law the force and effect of a charter of incorporation. Such is the usual mode of incorporating companies under the general corporation laws of the United States. See COMPANY; CORPORATION; INCORPORATION.

In England the term is employed to describe the printed regulations for the conduct of the business of a joint-stock company, organized and registered under the Companies Act of 1862. See JOINT-STOCK COMPANY.

ARTICLES OF CONFED'ERA'TION. See UNITED STATES, section on *History*.

ARTICLES OF FAITH. The summarized statements of the views held and taught by a religious body as the essential doctrine of its system. They have been divided, by Protestant writers, into articles that are fundamental and those that are non-fundamental. The best-known articles of faith are the Apostles' Creed; the Nicene Creed, established by the Council of Nice (A.D. 325); the Athanasian Creed; the statements of faith promulgated by the Council of Constantinople (A.D. 381), and by the Council of Ephesus (A.D. 431); the Thirty-nine Articles (see ARTICLES, THE THIRTY-NINE) of the Church of England, drawn up by Cranmer and Ridley, the Augsburg Confession, the Helvetic Confession, the Thirty-seven Articles of the Church of the Netherlands, the Westminster Confession, and the Articles of the Methodist Episcopal Church. No definite articles of faith appear to have been drawn up by the primitive Church until the spread of Christianity and the geographical separation of its different branches made some brief formularies necessary as a basis of union. See CREEDS AND CONFESSIONS.

ARTICLES OF WAR, UNITED STATES. The discipline and disciplinary procedure code of the United States Army. The articles, or rules, were originally copied from the English Mutiny Act, July 30, 1775, and then enlarged, September 20, 1776. The present articles, which are substantially the same as the former, were enacted April 10, 1806, and form Section 1342, United States Revised Statutes, being printed in full in the United States Army Regulations. They commence by a statement declaring that the armies of the United States shall be governed by these rules and articles; that the word officer, as used therein, shall be understood to designate commissioned officers; and the word soldier—all noncommissioned officers, musicians, artificers, privates, and other enlisted men; and the convictions mentioned therein shall be understood to be convictions by courts-martial. There are 128 articles altogether, to which all commissioned officers must subscribe on appointment. Under these articles expressions or conduct implying disrespect or disobedience toward the President, or those placed in authority, are prohibited; but provision is made for appeal against the decision or conduct of a superior. Mutiny, sedition, quarrels, frays and other disorders; dueling, and all that pertains to it; drunkenness on duty; sleeping on duty; and desertion of duty, as well as all other forms of misconduct during war, come under distinct clauses. The authority and order of procedure for every description of courts-martial or courts of inquiry is explicitly stated, as well as the law to be observed in the discharge or dismissal of officers; the disposal of the effects of deceased officers or men; and the treatment of spies. Subordination to civil authority is enjoined, attendance at divine service encouraged, and punishment ordered in instances of profanity or abuse. Soldiers are also forbidden to hire other soldiers to perform any of their duties. The concluding article ordains that the articles shall be read and published once in every six months to every garrison, regiment, troop, or company in the services of the United States, and shall be duly observed and obeyed by all officers and soldiers. See MILITARY LAW and COURTS, MILITARY.

ARTIC'ULA'TA (Lat. nom. neut. plur. of *articulatus*, jointed, from *articulus*, joint) or ARTICULATED ANIMALS. One of the primary divisions of the animal kingdom, according to the system of Cuvier, now divided into several. See ANNULATA; ARTHROPODA; SCOLECIDA.

ARTIF'ICER (from Lat. *artifex*, a master in the liberal arts, an artist). A soldier who is a mechanic, blacksmith, farrier, wheelwright, carpenter, harness-maker, or machinist, and who is carried on the rolls as an artificer. In the United States Army such a soldier is enlisted as a private, and is appointed artificer by the company commander. He receives the pay of a corporal. In England, he would be assigned to the ordnance store corps, and work at his particular trade. Each regiment has also its corps of pioneers, who are mechanics, and receive extra pay for their work. Similar branches are a part of the organization of all other European armies.

AR'TIFI'CIAL BUT'TER. See BUTTER.

ARTIFICIAL COT'TON. See COTTON, ARTIFICIAL.

ARTIFICIAL FLOW'ERS. See FLOWERS, ARTIFICIAL.

ARTIFICIAL HORI'ZON. A reflecting surface, usually of mercury, used with the sextant (q.v.) or reflecting circle in measuring altitude when the natural horizon is indefinable, and in determining the zero for all instruments by which altitude is measured.

ARTIFICIAL LIMBS. The art of replacing lost limbs by artificial ones made of some appropriate material is very old. In the Museum of the Royal College of Surgeons, in London, there is an artificial leg of bronze, wood, and iron, exhumed from a tomb at Capua, Italy, in which, together with the skeleton of the wearer, were found three vases assigned to the year B.C. 300. Herodotus relates the tale of an Elean, captured by the Spartans and confined with one foot in the stocks, who secured his release by amputating his own foot, and who afterwards wore a wooden foot. Pliny declares that M. Sergius, about B.C. 167, made and wore an artificial hand, with which he fought in battle. The celebrated artificial hand of the German knight, Götz von Berlichingen (1480-1562), 'the Iron-handed,' weighed three pounds, and was so constructed as to grasp a sword or lance. It was invented by a mechanic of Nuremberg, and is preserved at Jaxthausen, near Heilbronn, a duplicate being in the castle at Erbach, in the Odenwald. According to Scott's *Border Antiquities*, the family of Clephane, of Carslogie, "have been in possession from time immemorial of a hand made in the exact representation of that of a man, curiously formed of steel," and that it was given by one of the kings of Scotland to a laird of Carslogie, who had lost a hand in the service of his country. Ambroise Paré described, in 1564, an iron arm constructed for a Huguenot captain, with which he could hold his shield as well as his bridle-rein. Lorrain, a French locksmith, manufactured artificial limbs, under Paré's suggestions, with much success. Father Sebastian, a Carmelite monk, is credited with being the next to construct such limbs, with less success. Verduin, a surgeon of Holland, invented an artificial leg in 1696, which bore his name, and which was amended in later years by Serré. It is claimed that, early in the Nineteenth Century, Baillif, of Berlin, constructed a hand which did not exceed a pound in weight, and in which the fingers, without the aid of the natural hand, not only exercised the movements of flexion and extension, but could be closed upon and retain light objects, such as a hat and even a pen. In 1790 and 1810 patents were taken out by Thomas Mann, and in 1800 by James Potts, both of England, for artificial legs of wood. Potts's leg was used by the Marquis of Anglesea (who lost a leg at Waterloo), and was hence called the 'Anglesea Leg.' In 1818 von Gräfe invented a mechanical appliance for artificial legs, which is largely used with modifications, by European makers. William Selpho, who worked with Potts in England, introduced the 'Anglesea Leg' in America. It was superseded by the 'Palmer Leg,' a lighter and more adaptable invention by B. F. Palmer, an American cripple. Palmer's leg was patented in 1846, 1849, and 1852. Other American makers have been George W. Yerger, W. C. Stone, J. Russell, O. D. Wilcox, J. S. Drake, and A. A. Marks. Marks was the first to suggest rubber feet and hands, and his artificial limbs are now the most commonly used of any in America. His first patents were issued in 1856 and 1860. In 1845 a Dutch mechanic, van Peeterssen, invented a hand which could be used by an actor, M. Roger, to pick up a pen or hold a leaf of paper, draw a sword from the scabbard, etc. Van Peeterssen's conceptions have been extended and improved by the Messrs. Charrière, the celebrated surgical mechanics of Paris, aided by M. Huguier, the well-known surgeon. A very marvelous arm has also been constructed by M. Béchard. The utility of an artificial arm depends much on the nature of the stump. A stump above the elbow is best suited for an arm when it gradually tapers to its lowest end, and terminates in a rounded surface. When an arm is removed at the shoulder-joint, and there is no stump, an artificial arm can still be fixed in its proper place by means of a corset. In amputation below the elbow-joint, the best stump is one which includes about two-thirds of the forearm; while a stump formed by amputation at the wrist is very unsatisfactory. The simplest form of artificial arm intended to be attached to a stump terminating above the elbow "consists of a leathern sheath accurately fitted to the upper part of the stump. The lower end of the sheath is furnished with a wooden block and metal screw-plate, to which can be attached a fork for holding meat, a knife for cutting food, or a hook for carrying a weight" (Heather Bigg). The arm should be so carried as to represent the position of the natural arm when at rest. It is retained in its position by shoulder and breast straps, and forms a light, useful, and inexpensive substitute for the lost member. More complicated and therefore more expensive pieces of apparatus are made, in which motion is given to the fingers, a lateral action of the thumb is obtained, and the wrist movements are partially imitated; and a degree of natural softness is given to the hand by a covering of gutta-percha and india-rubber. Artificial rubber hands are now made in America that will write with a pen, manipulate the lever of a locomotive, row with an oar, cancel tickets, hold papers, work telegraphic keys, hold reins in driving, as well as use a pickax, carry a heavy weight, etc.

Artificial legs, having fewer requirements to perform than artificial arms, are comparatively simple in structure. We borrow the description of the ordinary bucket-leg in common use among the poorer classes from Mr. Bigg's *Orthopraxy*. "It consists of a hollow sheath or bucket, accurately conformed to the shape of the stump, and having—in lieu of the more symmetric proportions of the artificial leg—a 'pin,' placed at its lower end to insure connection between it and the ground. This form of leg is strongly to be recommended when expense is considered, as it really fulfills all the conditions excepting external similitude embraced by a better piece of mechanism. It is likewise occasionally employed with benefit by those patients who, from lack of confidence, prefer learning the use of an artificial leg by first practicing with the commonest substitute"—as, when the body rests on a single leg, the centre of gravity passes through the tuberosity of the ischium, it is essential that the bucket should be so made as to have its sole point of bearing against this part of the pelvis. Artificial legs are so made in America, provided with rubber feet, that the wearer can dance, skate, ride a bicycle, ride a horse, walk in pedestrian contests, climb ladders, and live the usual life of an active laborer or mechanic. There are many scores of men in the service of railroads as conductors, brakemen, switchmen, etc., who wear an artificial leg, and are able completely to perform their duties. In cases of arrested development of the lower limbs, short-legged persons may be made of the ordinary height by the use of artificial feet placed below the true feet, and attached to the legs by means of metallic rods, jointed at the knee and ankle, or by long-topped shoes.

Other parts, not entitled to be called limbs, can also be replaced by mechanical art—such as the nose, lips, ears, palate, cheek, and eye. In the present advanced state of plastic surgery, deficiencies of the nose, lips, and palate can usually be remedied by an operation: cases, however, may occur where an artificial organ is required. Artificial ears are molded of silver or of wax, painted the natural color, and fixed in place by a spring over the vertex of the head. Loss of an eye causes sad disfigurement; but artificial eyes are made which are adapted to fit almost any socket left after enucleation, and which cannot be detected without the closest inspection. The color of the iris of the remaining eye is perfectly copied, and blood-vessels traversing visible portions are imitated exactly.

ARTIFICIAL SILK. See SILK, ARTIFICIAL.

ARTIFICIAL STONE. See STONE, ARTIFICIAL.

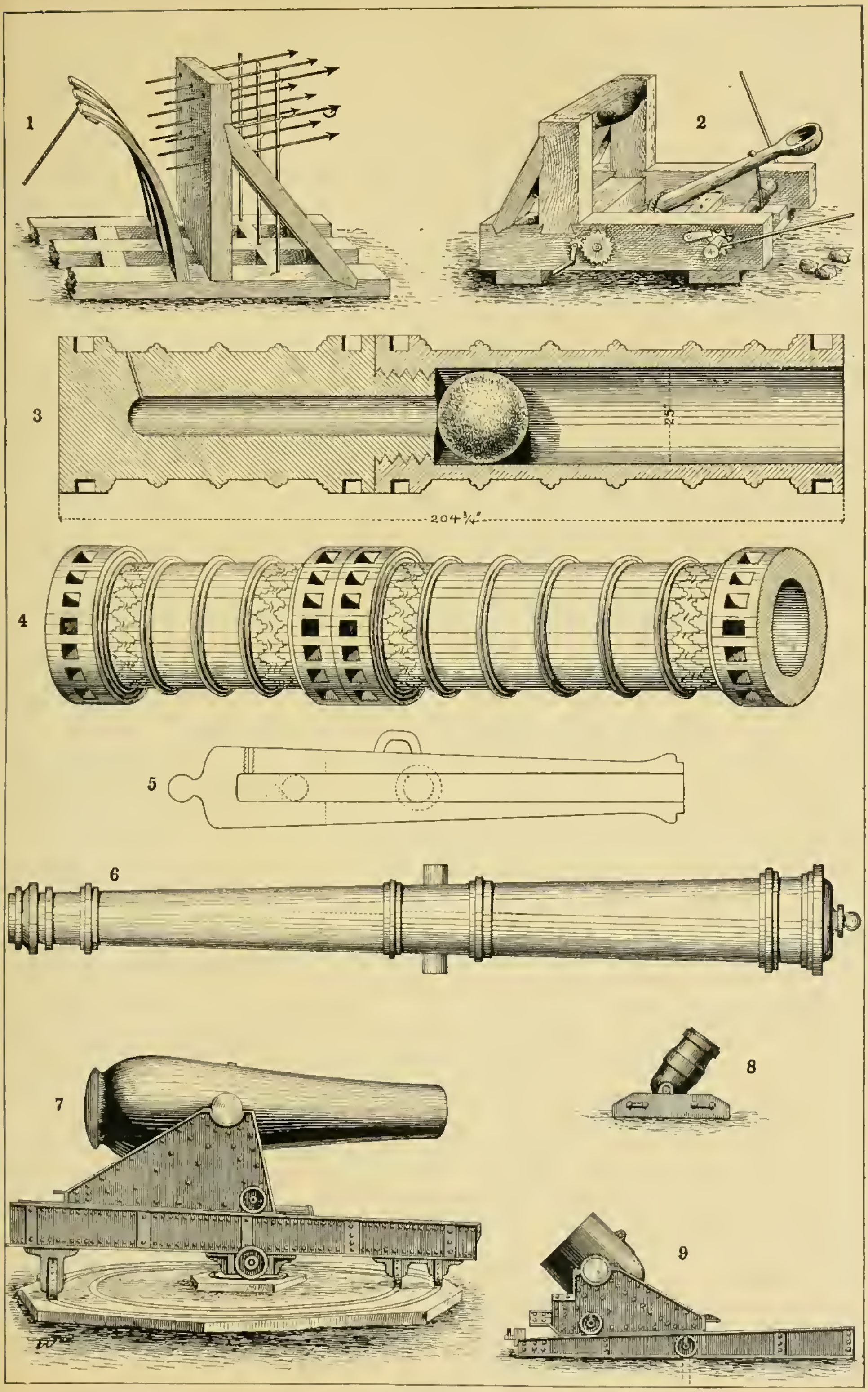
ARTIGAS, är-tē′gäs, FERNANDO JOSÉ (1755-1851). A South American soldier and dictator, born at Montevideo. At an early age he became captain of a corps in the Spanish provincial service, in which he continued loyal for some time after the outbreak of the insurrection in Buenos Ayres. In 1811, however, as a result of ill-treatment by his superior officers, he joined the Revolutionary forces, and won a number of victories. He afterwards joined the Republican army besieging the Portuguese troops from Brazil, and then occupying Montevideo, but he acted so independently that the commander-in-chief, Sarratea, outlawed him. He then organized an independent force of *gauchos* (cattle-drivers), defeated the troops sent against him, and forced the Junta at Buenos Ayres to give him the whole of Uruguay (1814), and recognize him as an independent chief. He drove the Portuguese out of Montevideo, became dictator, and in 1815 made an unsuccessful effort to take Buenos Ayres. Repeated efforts to effect a reconciliation between the parties were rendered futile by personal animosities, and eventually General Artigas was defeated, and in 1820 fled to Paraguay; but the Dictator Francia sent him to Candelaria, where he passed the remainder of his life in peace as a political exile.

ARTIL′LERY ("from OF. *artiller*, Sp. *artillero*, It. *artigliero*, OF. *articulier*, explained in a Latin-French glossary as = *artifex*, a master in the liberal arts, an artist; as if from Lat. *articularius*, apparently from *articulum*, dimin. of *ars*, art.") For the development of the meaning, cf. Engl. *engine*, from Lat. *ingenium*, natural capacity, talent, genius.

EARLY ARTILLERY MACHINES. Before the invention of gunpowder, the word 'artillery' referred to machines for throwing heavy missiles, in which the projecting force was obtained by a spring or weight suddenly released. These included catapults, bows, crossbows, slings, ballista, the onager, the springal, etc. The ballista and onager projected their missiles, usually stones, from a bag or bucket, using the spring as a source of energy. The catapult and springal were large crossbows projecting their missiles from a trough or platform. It is reported in some ancient accounts that stones weighing several hundred pounds were thrown over half a mile. The projectiles used included large beams or logs, heavy arrows and stones, and also inflammable material, which was projected over the walls of a town, castle, or other fortified place, to set fire to the interior. The machines above mentioned, having little mobility, were restricted almost entirely to use in the attack and defense of fortified places during the progress of a siege. In modern use the word 'artillery' is applied, first, to all projectile arms which are supported by carriages, in contradistinction to arms which are discharged from the hand or shoulder; second, to the troops serving such arms; third, to the science which treats of the service of the guns and the organization and administration of the personnel. In general the term 'artillery' is used to designate the guns and other matériel of projectile machines using gases as the projectile force, the personnel which serves the matériel, and the science or art dealing with the service of the former and with the organization of both to form a system for use in offensive and defensive warfare.

EARLIEST RECORDS. The word 'cannon,' formerly used by military men, and to-day sometimes used by laymen to designate the weapon of artillery, has been almost entirely superseded by the word 'gun.' For example, we speak of a 3.2-inch, 10-inch, or 12-inch *gun*, and not of a 3.2-inch, 10-inch, or 12-inch *cannon*. The invention of cannon or guns immediately followed that of gunpowder, about which very little is accurately or definitely known. By some authorities it is believed that the Chinese and inhabitants of India had a knowledge of gunpowder and its use for artillery purposes long before the European nations. It has also been stated, that in the Thirteenth Century, the Moors used gunpowder and cannon in Spain. This antedates the alleged discovery or invention of gunpowder by the German, Schwartz, or by the Englishman, Roger Bacon, toward the end of the Thirteenth Century. Some authorities claim that the first use of cannon in battle was at Crécy (1346), and that they were introduced and practically used by the English about that time. There is, however, considerable doubt as to the authenticity of the above claim, and it is not until some time later that we have definite information as to the nature and effect of cannon in battle. All ordnance of this period consisted of huge, cumbersome weapons, with little or no mobility. They were moved either by draft animals hitched in file, or by human power, or by both, necessitating an extravagant expenditure of energy and time. Their construction was of the crudest na-

ARTILLERY—HISTORICAL WEAPONS



1. CATAPULT.
2. BALLISTA.
3-4. GUN OF MAHOMET II.
5. NAPOLEON FIELD GUN.
6. CULVERIN.
7. RODMAN 10-INCH GUN.
8. COEHORN MORTAR.
9. CAST IRON 10-INCH MORTAR.

ture, both guns and carriages, all mechanical work being done by hand. Though so inferior in every respect, these guns correspond in a way to the heavier type of modern siege guns, and were used for similar purposes, there being at this time no guns of mobility corresponding to the modern field battery. The earliest cannon were of the simplest construction, being merely tubes closed at one end, the powder being exploded by means of a hot iron applied to a train of powder passing through the touch-hole to the charge within. These guns were known as 'vases' and 'bombards,' and were bell-shaped rather than cylindrical. They were supported by rough wooden horses carrying platforms, the latter sometimes being carried by two wheels in front and a trail attached to the axle. At first the material used was iron bars held together with hoops; sometimes hammered iron or copper, laboriously fashioned by hand; later, guns were cast from bronze and other composition metals. One of the most famous of these old guns was a huge weapon employed by the Turks in the middle of the Fifteenth Century, and known as the 'Gun of Mohammed II.' It fired a stone ball weighing over 600 pounds, and its immobility was such that it required 200 men and 60 oxen to move it from place to place. Curiously enough, these heavy pieces were fired without a carriage, being rolled along on their side, and given the proper direction and elevation by blocks and wedges inserted under the muzzle. A type of projectile similar in form to those discharged by these early cannon can be seen at Trophy Point, West Point, N. Y. It was not until near the end of the Fifteenth Century that guns began to be used on the field of battle as 'field artillery.' There was no uniform type, and their value as weapons was insignificant, except in so far as the noise of the explosion frightened the enemy.

First Half of Sixteenth Century—Wars of Charles V. (1521-44). In the wars of Francis I. of France and the Emperor Charles V., artillery began to establish a reputation as a weapon. The matériel, personnel, and draft were still very crude, but guns began to be used effectively on the field of battle. The conical-shaped bombards and vases gradually disappeared during this period, and were replaced, in the siege-train, by culverins (18-pounders) drawn by oxen; and in field artillery by cannon (2-, 4-, 6-, and 8-pounders, from the weight of the projectiles thrown) called 'falcons,' 'falconets,' and 'sakers.' It took many years to devise a carriage which would serve both for transportation and for service. This was gradually developed during the progress of the Franco-Spanish wars. The personnel for this 'field artillery' was supplied by temporary detail from adjacent fortresses or by hired or impressed civilians. Drivers and animals for transportation were obtained in the same way. The loss of guns in battle was common, because of their immobility. A temporary retirement meant the capture of the guns, and an advance made them useless, as they were then masked by the infantry. The first battle in which artillery played an important part in the general result was at Marignano (1515), where the French had about 350 guns. The Swiss infantry were unable to stand the fire of this artillery, which covered an important crossing. The result was a French victory. At Pavia (1525) the French would have probably won another victory, had their artillery not been masked by their own troops at a critical juncture of the battle.

Latter Half of Sixteenth Century—Religious Wars of France. In the religious wars of France, the use of artillery was greatly developed and improved both by the Catholics and by the Huguenots. It was a period during which field artillery began to be used in accordance with the principles of tactics—that is, it was massed or deployed with reference to the other arms of the service, to attain a common end; so that we may consider this an epoch in the general development of battle tactics for field artillery. It was about this time that the numerous kinds and calibres of field artillery were reduced to four (6-, 12-, 24-, and 48-pounders) in the Dutch artillery. This was another important step in the development and improvement of a system of field artillery. During these wars there was a proportion of one gun to about 1000 men of the other arms of the service.

The Thirty Years' War (1618-48). It is, however, to Gustavus Adolphus that we owe one of the most important improvements in field artillery—namely, mobility. He soon recognized the defects of artillery in this respect, and that the efficiency of artillery was in exact proportion to accuracy, rapidity of fire, and quickness of movement on the battlefield. A curious fieldpiece, sometimes called the 'Kalter,' sometimes the 'leather' gun, consisting essentially of a cylinder of beaten copper, strengthened with iron bands and tangentially supported by coiled rope, the whole being covered with leather, was introduced by him in the Polish War. It was drawn and served by two men only, but of course had little power. Later it was replaced by iron 4-pounders, drawn by two horses. So many were the improvements made by this remarkable military genius, that his field-guns could be fired more rapidly than the infantry musket. Gustavus Adolphus considered six field-guns to 1000 men of other arms as the most efficient proportion. He first introduced the 'battalion' system of guns by attaching two to each regiment of infantry and placing them under the orders of the colonel; but he always kept a large number of guns in reserve for critical moments in a battle. It may be said, in passing, that the result of many of the battles of Gustavus Adolphus would have been different but for his improvements in the construction and use of field artillery.

Latter Part of the Seventeenth Century—The Wars of Louis XIV. The French artillery was greatly improved during the time of Louis XIV. The material was both bronze and iron, calibres were limited to 4-, 6-, 8-, 12-, 18-, 24-, and 36-pounders; canvas cartridges and grapeshot were employed. Howitzers and mortars came into use, and explosive shells were introduced into the field artillery by the English and Dutch. Louis XIV. was the first (1671) to establish a permanent organization for artillery. William III. (1689-1702) reorganized the personnel and formed the first regimental establishment. Formerly men were detailed from other arms for duty with the artillery when needed. Louis XIV. also established schools for the instruction of officers in the science of gunnery, introduced platform wagons, wrought-iron field and mortar carriages, and a new and efficient carriage for sea-coast guns.

The English artillery at this time was considerably inferior, in mobility, at least. The largest gun used by them during this period was a demi-cannon, weighing about 6000 pounds, exclusive of the carriage. The famous laboratory at Woolwich, England, was established in 1672. In the War of the Spanish Succession, the proportion was four guns to every 1000 men of other arms. The guns were used with great effect and skill. The mobility of the artillery increased in all the armies except the English, and it is in this respect that Marlborough differed most radically from Gustavus Adolphus, as the former never attempted to improve the matériel which the latter so efficiently used.

The Eighteenth Century—The Wars of Frederick the Great. It is remarkable that Frederick the Great should have neglected his artillery as he did in the early battles of his career. It was not until later that its true value as a weapon was learned by him; and, like most military lessons, it was learned by costly experience. The defect of Frederick's artillery was its immobility. The following from Decker will illustrate its inferiority and Frederick's methods of handling it on the field of battle: "The direction of two pieces was intrusted to a corporal, to whom all initiative was forbidden. The commander of the battalion alone had the right to control the guns; but he was too much occupied with his men to think of the cannon. The consequence was that the two pieces marched quietly behind the battalion; but upon arriving within 500 paces of the enemy they unlimbered and continued to advance, dragged by the men. It is very doubtful whether the corporal had any particular instructions for the fight. We only know that he had orders not to fire grape until within 350 paces, and always to keep himself 50 paces in front of the battalion; a very convenient measure, doubtless, but one which did not take into consideration that artillery is effective only in position, and not while marching. Worst of all, when the battalion was beaten, the loss of the pieces was almost inevitable, for want of time to limber up." After the battles of Rossbach, Leuthen, and Hochkirch, Frederick, appreciating at last the valuable service rendered by his artillery during these three important battles, improved and increased the number of guns to five for every 1000 men of other arms. He also created a horse-artillery system of ten light 6-pounders, which was able to accompany his cavalry. His field-artillery was also improved as his infantry decreased in number, and consisted of 3-, 6-, and 12-pounder guns and 7-, 10-, and 25-pounder howitzers. The Austrian artillery opposed to Frederick's was much superior. The tactics of this period consisted in massing the guns, but the fire itself was not concentrated, the range of the guns being so inferior that it was impossible to concentrate the fire of separated batteries on the same distant object. The general result of these wars, so far as artillery is concerned, was the formation and organization of position gun batteries, which were assigned to brigades of infantry, the formation of howitzer batteries, and the creation of horse artillery.

Gribeauval Epoch (Commencing 1765). Gribeauval, sometimes called the 'father of modern artillery,' was ordered to reconstruct the French system of artillery in 1765. He separated the artillery into the four classes now generally recognized by artillerists—namely, field, siege, garrison, and sea-coast, and provided for each a distinct matériel. He at once recognized the advantage of decreasing the number of calibres for each kind of service. The guns for field batteries were limited to 3 calibres (4-, 8-, and 12-pounders) and 6-inch howitzers. By decreasing the length and weight of the pieces, omitting ornamentation and strengthening the carriage, decreasing the windage and the charge, he greatly improved the mobility of the system. Uniformity, lightness, and strength were the ends aimed at. Improvements in sights and elevating apparatus greatly increased the accuracy and rapidity of fire. The organization was also improved. Two field-guns were assigned to each battalion of infantry, and the men for the service of these pieces were drawn from the company of artillery assigned to each infantry brigade. In addition to this there were eight pieces assigned to the centre and each wing of the army. Each eight pieces constituted a 'division,' manned by a company of artillery assigned to each. Gribeauval was the first to develop the use of the prolonge, the rope used to unite the trail with the limber, when retiring firing. Horses were hitched in pairs instead of in file. A new ammunition wagon was provided. In Gribeauval's system, however, drivers were still hired, as formerly, and the dispersion of the guns among battalions was a serious defect. Horse artillery was established in the French Army in 1791, and in the British Army in 1793. Gribeauval's improvements in garrison and sea-coast carriages resulted in a type, similar in essential principles, to those used in England and America up to the middle of the Nineteenth Century.

Beginning of Nineteenth Century—Artillery Under Napoleon. Napoleon created a divisional artillery by withdrawing the guns from the battalions, forming them into batteries, and assigning the batteries to infantry divisions. This added to their efficiency and relieved the infantry battalion of an impediment. He made many important improvements, both in organization, administration, and the tactical employment of artillery in the field. He reduced the calibres for the field-batteries to 6-pounder guns and 24-pounder howitzers, and to 4-pounders for the horse-batteries. He used military drivers for horse-batteries, and did away with the general custom previous to this advance of hiring teamsters by contract. They now formed a part of the military organization. Napoleon always held in reserve a large number of guns for use at the decisive moment of the battle, and effectually employed the modern system of concentration of fire from separated masses of guns. His artillery played a most important part at Friedland, Wagram, Borodino, Lützen, and Waterloo. As Napoleon lost his infantry he increased the number of guns per 1000 men. At Austerlitz the proportion was 2½ guns, at Wagram, nearly 4, to each 1000 men of other arms. A study of his campaigns is of the utmost importance, as it gives, perhaps as no other series of campaigns, a detailed account of the possibilities of field-artillery. With but slight variations, his battle tactics are to-day taught in all the text-books on the subject.

British Artillery. Just before the English wars on the Continent, which began in 1793, the British artillery consisted of a train composed of both field and siege guns, organized in brigades of 12 pieces each. Two guns were assigned to each infantry battalion. Draft was by three horses in single file, the drivers being carters on foot. The necessity for reorganization and improvement was soon made apparent. The driver corps for the guns was established in 1794. The dispersion of the guns among the infantry battalions was abolished in 1802, the guns being formed into field-batteries or brigades of 6 guns each. Shrapnel was invented by Major Shrapnel in 1803, and Congreve rockets by Sir W. Congreve in 1806. Horses were harnessed in pairs, the drivers riding the off-horses. There were 6 horses to each gun and 4 to each caisson. The armament for each battery was 5 guns and 1 howitzer, uniform in each field-battery, either 6-, 9-, or 12-pounders. The howitzers were 5½-inch brass pieces. At first the horse-batteries contained two 9- and three 6-pounders, but later all five guns were 9-pounders. Congreve rockets were unique reversions to earlier artillery weapons, but seem to have been effective. The rocket consisted of a sheet-iron case inclosing the explosive, and was fired from a tube. They were first used at Leipzig (1813) and with great success; also in the Peninsular War at the passage of the lower Adour (1814), and at Bladensburg, against American troops. Notwithstanding the above improvements, the British artillery still lacked mobility. Improvement in this direction was steady up to the time of the Crimean War.

Crimean War. Previous to this war, the corps drivers in the British artillery were replaced by enlisted cannoneers and drivers in 1822, and in the French in 1829. The field-batteries consisted of 4 guns and 2 howitzers each, the guns being 8- and 12-pounders, and the howitzers 24- and 32-pounders. Weights were reduced, and the ammunition was carried in chests on the limber. Seats were provided for the cannoneers on the limber-chests and the caissons, and the 2 flasks in the trail were replaced by a single 'stock.' To Napoleon III. is due the establishment of a field-battery consisting of a single calibre. The gun was known as the 12-pounder Napoleon. The French artillery at this time was divided into horse-artillery (the cannoneers being mounted), line-artillery, commonly known as 'field-artillery' (the cannoneers on the chests), and reserve or siege artillery, in which all the men marched on foot. This was the organization at the time of the Crimean War. The British artillery was organized as "position, heavy field, field, horse, and mountain batteries, armed respectively with 18-, 12-, 9-, 6-, and 3-pounder guns, and 8-inch, 32-, 24-, and 12-pounders, and 4-inch howitzers. A rocket section was attached to each battery of field and horse artillery." (See Wagner, *Organization and Tactics.*) The Crimean War consisted principally of siege operations, and there was therefore little opportunity for the tactical use of field-pieces. At Inkerman (November 5, 1854), however, both sides employed artillery with some effect. The maximum effective range obtained by the guns of this period was only about one mile, and it became evident during the war that the power of the field-gun had to be increased and its fire made more accurate if it was to become effective in a contest with infantry. Rifling, though first practically applied in 1846, was not developed until after the Crimean War. Rifled siege-guns were first used by the British at the siege of Sebastopol, but with little effect, on account of poor construction. In reference to the question of rifling and breech-loaders, Lloyd and Hadcock, in their *Artillery: Its Progress and Present Position*, state that as early as 1547 the principles of rifling and breech-loading had been experimented with in England. A few years after Sebastopol, the Armstrong breech-loading rifled gun, which was first used in the China Campaign of 1860, was introduced into the British artillery.

Italian War (1859). Rifled field-guns first appeared on the field of battle in the Italian War of 1859, being one of the many improvements made practical by the French. The smooth-bore 12-pounder Napoleon gun and the 4- and 12-pounder rifled muzzle-loader familiar to the Union service during the Civil War, played a prominent part in this war. The Austrian artillery at this time consisted entirely of 6- and 12-pounder and 32-pounder howitzers, all smooth-bore. By rifling, the effective range of the French field-gun was increased to about 2500 yards. The Austrian smooth-bore, with an effective range of only 1450 yards, was therefore at a great disadvantage.

Civil War in the United States. *Field Artillery.*—At the beginning of the Civil War in the United States, the field-artillery consisted of eight batteries. Most of the sea-coast artillery was promptly converted into field-batteries. The armament was 3-inch muzzle-loading rifles and 12-pounder (smooth-bore) Napoleons. The Napoleon gun was used throughout the Civil War, and with great effect at the shorter ranges. The range of the Ordnance Department 3-inch gun was 2800 yards, and that of the 12-pounder Napoleon about 1500. The objection to the Napoleon, as to all smooth-bore arms, was its inaccuracy at long range. In the Eastern armies the battery contained at first six pieces, later four. There were four batteries to each division; and when the divisions were organized into corps, about half of the divisional batteries formed the corps reserve. In 1863, division artillery was abolished, and the batteries of each corps were formed into an 'artillery brigade.' This system obtained until the close of the war. A brigade contained from four to twelve batteries. In the Western armies, a battery of artillery was assigned to each infantry brigade, and this organization was retained until 1863. Subsequent changes all tended toward the concentration of batteries. In the Confederate Army of Northern Virginia, the artillery was formed into battalions of four batteries each, and a battalion assigned to each infantry division. To each army corps was assigned two battalions of 'corps artillery.' This organization of field-artillery, with minor changes, has since been adopted by most of the powers. "The War of Secession gave the tactics of artillery a long stride forward. It developed the use of masses of guns to an extent unknown since the days of Napoleon. It infused into the handling of that arm a degree of audacity foreshadowing the tactics of 1870; and if its offensive use in masses had not been all that could be wished, it was due to causes beyond the control of the arm itself." (Wagner, *Organization and Tactics*, New York, 1895). *Siege and Sea-Coast Artillery.* Up to about 1890, the United States had for sea-coast defense and siege-trains only the guns left over from the Civil War. These were principally Rodman smoothbores and Parrot rifles, both cast-iron and muzzle-loaders. They were supplemented in 1872 by the addition of 8-inch muzzle-loading converted rifles, the old 10-inch Rodman being utilized for this purpose. The leading position of American artillery in 1861 was largely due to Lieutenant Rodman, of the United States Army. His principle consisted essentially in casting guns by cooling from the interior. The system of artillery in the United States at the beginning of the Civil War embraced the following: "Field: Wrought-iron 3-inch rifle, bronze 6- and 12-pounder guns, 12-pounder Napoleon, 12-pounder mountain, and 12-, 24-, and 32-pounder howitzers. Siege and garrison: Cast-iron 4½-inch rifle, 12-, 18-, and 24-pounder guns, 24-pounder and 8-inch howitzers, and 8-inch and 10-inch mortars; Coehorn mortars (bronze). Sea-coast: 32-pounder gun, 8-, 10-, and 15-inch Columbiads, 10- and 13-inch mortars. The total embraced seven different calibres of guns, three of Columbiads, four of howitzers, and four of mortars, or eighteen altogether—the same as in 1850. In 1861 the smooth-bore system of the United States was certainly excellent. In quality of cast-iron used, and its manipulation during manufacture, it has been claimed, and with good reason, that the ordnance department of the United States Army led all others. If not the first upon the ground, the department was among the pioneers in heavy modern armaments, as was shown by the casting, successfully in that year, of what at the time was the most powerful weapon known — a 15-inch Rodman gun, followed, in 1864, by a similar but 20-inch smoothbore, throwing a shot weighing 1080 pounds. This was a grand stride, and placed the American artillery in no secondary position in the array of national armaments at that time developing." (Birkhimer, *Historical Sketch of the Artillery, United States Army*, Washington, 1884).

Austro-Prussian War (1866). During this war, nothing of importance, either in matériel, organization or tactics, was developed by either the Austrians or Prussians. The field-battery of the Prussians consisted of six guns, generally steel breech-loading rifled guns, called 6- and 4-pounders, the first class using a 15-pound oblong shell, and the latter a similar 9-pound shell. Shell-fire, using percussion fuse, was used almost exclusively. The Austrian artillery, on the other hand, was armed with muzzle-loading rifles (8- and 4-pounders), each battery containing eight pieces. The Austrians still retained the system of 'brigade' artillery, and used rocket batteries. In this war 'brigade' artillery and rocket batteries appeared for the last time, and breech-loading rifled field-guns for the first time. The Prussians handled their artillery ineffectively during the entire war, the Austrians being far superior to them in initiative and dash.

Franco-German War. The Prussians made great improvements in artillery after 1866, and their use of artillery in 1870 was one of the most important military lessons of that war. Reserve artillery disappeared, and divisional and corps artillery alone was employed. To each cavalry division two batteries of horse artillery were attached. The guns employed were steel breech-loading rifles, 6- and 4-pounders. The proportion of artillery was 3.7 guns to a thousand men. The French used muzzle-loading rifles (8- and 4-pounders). A few 12-pounder Napoleon guns seem still to have been in service. The mitrailleuse used by them was a machine gun. Their proportion of artillery was three guns to 1000 men. "The characteristic features of the artillery tactics of the Franco-German War may be summed up as follows: On the march, the German artillery was no longer kept in rear of columns of infantry, but was pushed well to the front, being preceded only by enough infantry to protect it from surprise. It was brought into action at the very first opportunity, and almost invariably in large masses, which concentrated their fire upon the objective of the infantry attacks. Its fire, in almost every case, was deliberate and accurate, and was employed at ranges varying from 3300 to 650 yards; while the French wasted their ammunition in a rapid fire at ranges too long for the best effect. The French committed the further fault of retaining their batteries too long in reserve, and employing them too often singly instead of in masses. The mitrailleuse did not meet the high expectations that had been formed of it, though its effect was sufficient to foreshadow the extensive use of machine guns in future wars. Borbstaedt acknowledges that these guns did produce a considerable effect, partly from the strange, rattling noise they made, partly from the rapidity with which an immense number of projectiles were fired; and he says: 'It cannot be denied that the French mitrailleuses caused heavy losses to the attacking German troops, especially in positions where it was possible to keep them concealed till the decisive moment had arrived.' The mistake of pitting these guns against the German field-artillery was frequently and disastrously made by the French. They were good only in the defense of positions." (Wagner, *Organization and Tactics*, New York, 1895).

Russo-Turkish War. The guns used by the Russians in this war were inferior to those used by Prussia seven years before. They were bronze breech-loading rifles, the heavy being 9-, and the light, 6-pounders. The matériel of the Turkish artillery was superior to that of the Russians, being composed of Krupp's steel breech-loading rifle guns, 8 and 9 centimetres calibre (3.2 and 3.5, inclusive). The Russians had 3.9 guns to 1000 men, the Turks only 2.2. During this war nothing new was developed either in organization, matériel, or tactical handling of field artillery.

Spanish-American War. During the Spanish-American War of 1898, there was little opportunity for the use of artillery at Santiago or elsewhere. The American field-artillery used 3.2-inch breech-loading steel rifles. Unfortunately, smokeless powder had not been supplied to these batteries, the result of which was the exposure of the exact position of the batteries to the Spanish artillery and riflemen. Smokeless powder was supplied immediately after this fight. The 3.6-inch field-mortar was used to a limited extent. The siege-train included the 3.6-in. gun and mortar, 5-inch siege-gun, and 7-inch howitzer. It was organized at Tampa, Fla., but never used. In the Philippines and China the 3.2-inch United States field and experimental mountain guns, purchased here and abroad, were employed.

Boer War. In this war, as in the Spanish-

American, there was little occasion for the tactical use of artillery. In general, the Boer modern long-range, quick-firing gun was superior to the older type of gun used by the English.

Little has been said of sea-coast artillery in the above historical sketch, as its scientific development, in which the United States has taken a prominent part, was commenced only during the last years of the Nineteenth Century. The modern weapons of artillery are now such complicated and complete pieces of mechanism that the various groups can best be considered when treated by themselves, and accordingly the reader is referred to the articles Coast Artillery; Field Artillery; Guns, Naval; Horse Artillery; Howitzers; Machine Guns; Mortars; Mountain Artillery; Ordnance; and Siege Guns; in which will be found illustrated descriptions of most forms of modern ordnance.

Bibliography. Wagner, *Organization and Tactics* (New York, 1895); Grosse, *Military Antiquities* (London, 1801); Owen, *Modern Artillery* (London, 1873); Lloyd and Hadcock, *Artillery: Its Progress and Present Position* (Portsmouth, 1893); Birkhimer, *Historical Sketch of the Artillery, United States Army* (Washington, 1884); Birnie, "Gun-Making in the United States," in *Journal of Military Service Institution* (Governor's Island, 1891); Jerram, *The Armies of the World* (London, 1889); and *Drill Regulations for Coast Artillery, United States Army.* For the organization of artillery, and its relation to the other arms of a modern army, see Army Organization, and for a description of the tactics governing artillery see Tactics, Military; Siege and Siege Works; Fortification; and Coast Defense; for a discussion of the theory of various artillery weapons, see Ballistics and Gunnery; for the construction and the mechanical details of different forms of cannon, see Ordnance. See also Projectiles; Fuze; Primer; Ammunition; Range and Range-finder; Explosives; and Gunpowder. The article Armies gives the proportion of artillery in the various modern armies.

ARTILLERY, PARK OF. A name applied to a collection of guns, in camp or barracks. In action or siege, the guns are parked out of reach of the enemy's fire when not in use themselves. The name is collective in that it covers the whole force and equipment necessary and essential to the working of field or siege guns. The equipment of a gun-park consists of reserve guns and carriages, ammunition wagons and caissons, implements, and material necessary for repairing and completing equipments, and harness-stores, field-forges, etc. The *personnel* consists of the officers and men of the batteries, smiths, wheelwrights, saddlers, armorers, drivers, and other artificers and laborers.

ARTILLERY CAR'RIAGES. Artillery carriages are of two classes: First, gun-carriages, designed so as to enable cannon to be transported thereon or fired therefrom. Of this class those for the sea-coast guns are fixed in position. Second, carriages designed for the transportation of material or ammunition necessary for use of the guns or field-carriages. Artillery carriages and gun-mounts will be found discussed at considerable length in the articles Ordnance and Guns, Naval, where the various mountings and apparatus for the firing and transport of modern cannon are described in connection with the mechanical features of the guns themselves. The field-carriages are the gun-carriage and its limber; the caisson and its limber; the combined forge and battery wagon, with its limber. The limber (q.v.) is a two-wheeled vehicle, upon which the front bearing is given to the after-carriage, and to which the draught-horses are attached. The caisson (q.v.) is a vehicle for the transportation of a reserve supply of ammunition. The combined forge and battery wagon is a vehicle for the transportation of tools necessary in making repairs for the ordnance material in the field. See also Artillery; Coast Artillery; Field Artillery; Machine Guns; Siege Guns; and Horse Artillery.

ARTILLERY COM'PANY, Ancient and Honorable, of Boston. The oldest regularly organized military company in America, dating from 1637, and formed on the model of the Honorable Artillery Company of London. In the early days of the colony it was a purely military organization, composed of the leading citizens of Boston and adjacent towns, and always ready for service. The military organization is still preserved, but the functions of the corps are now more or less social, though regular drills are still held at its armory in Faneuil Hall. A history of this command has been prepared, four volumes of which have already been published.

ARTILLERY COMPANY, Honorable. The oldest existing volunteer corps in Great Britain, and the model on which the Boston organization of similar name (see Artillery Company, Ancient and Honorable) was formed. It had its origin in 1537, in the days of the Tudor sovereigns of England, and is closely rivaled in point of antiquity by the Yeomen of the Guard, the Sergeant-at-Arms, and the corps of Gentlemen Pensioners. The beginnings of the modern artillery school may clearly be seen in the patent forming the company, which, in 1537, Henry VIII. granted to three persons, appointing them overseers of the "Science of Artillery" for longbows, crossbows, and hand-guns. The city of London has always taken great pride in the organization, which, curiously enough, is the only body of British troops, not regulars, permitted to parade in London streets with bayonets fixed. Until 1849 the members elected their own officers. Since then they have been crown appointments, made on the nomination of the lieutenancy of the city of London.

ARTILLERY CORPS, kōr. The artillery arm of an army. Its function and position in the organization of an army is discussed in the article Army Organization. In the United States Army, the regimental organization of the artillery was discontinued by act of Congress, approved February 2, 1901, and the entire arm was designated as the Artillery Corps. This corps was divided into two branches, viz., *Coast Artillery*, charged with the care and use of the fixed and movable elements of land and coast fortification, including the submarine mine and torpedo defenses; and *Field Artillery*, defined as that part which accompanies an army in the field, including field and light artillery, horse-artillery, siege-guns and mortars, and also machine-guns. The Secretary of War may, however, order coast artillery to other artillery duties, as may be demanded by the exigencies of service. All officers of artillery are placed on one list, arranged with regard to seniority in the several grades, and are assigned to Coast or Field Artillery, according to the demands of the service. The Artillery Corps consisted, in 1901, of a chief of artillery, 14 colonels, 13 lieutenant-colonels, 39 majors, 195 officers in each of the grades of captain, first lieutenant, and second lieutenant; 21 sergeants-major of the first class, and 27 of the second class; 1 electrician sergeant to each coast artillery post; 30 batteries of field-artillery; 126 batteries of coast-artillery, and 10 bands; a total of 651 officers, and 18,920 men, not including electrician sergeants. See ARTILLERY, ARMY ORGANIZATION.

ARTILLERY DIS'TRICT. UNITED STATES. In the reorganization of the artillery arm of the United States Army, effected in 1901, the regimental organization was abandoned, and the entire seacoast, including Hawaii and Porto Rico, divided into artillery districts, each in charge, usually, of a colonel or lieutenant-colonel of artillery, who is responsible for the fire-control and artillery efficiency of his command. The districts are merely tactical units and do not interfere in any way with the administration of the corps. There were in 1902 twenty-one such artillery districts, each embracing from two to seven forts, with a total of sixty-eight forts or stations altogether. Two of the most important districts are those of Eastern and Southern New York—Forts Schuyler, Slocum, and Totten belonging to the former; and Forts Wadsworth, Newton, Hamilton, and Hancock (N. J.) to the latter. A similar organization exists in England, with the added feature, however, that the district organization is made use of for purposes of recruiting. See ARMY ORGANIZATION; ARTILLERY CORPS; COAST ARTILLERY; and COAST DEFENSE.

ARTILLERY SCHOOLS. The United States artillery school, established at Fort Monroe, Va., constitutes an independent command, from which all reports and returns are made to the headquarters of the army. It is governed by special regulations, modified from time to time, as may be necessary. The school consists of a commandant, adjutant, officers detailed as instructors, and of the troops and enlisted men assigned for duty or instruction. The commandant and the heads of the departments, in addition to forming the faculty, constitute a board of artillery for the general service, to which questions of professional interest can be submitted. Besides the instructors, the student-officers are usually attached to the batteries serving at the post. Details for instruction are made first from non-graduates of the Military Academy, who have not already served at the school, and then from graduates of the Military Academy who have not served at the school. The first artillery school for practice was established at Fort Monroe in 1824, but was discontinued six years later. A second attempt was made in 1858, but was stopped by the Civil War. The school was again started in 1867, but it was temporarily discontinued in 1898, owing to the officers being needed in the field, etc., during the Spanish-American War. It was reëstablished in 1900, the course being for one year, commencing September 1, and under the plan then adopted was intended chiefly for the recently appointed lieutenants of artillery not graduates of the Military Academy, a considerable number of whom were admitted to the army during and after the Spanish-American War. Instruction is both theoretical and practical, and the course is closed by an examination before a board of officers especially appointed for the purpose. The curriculum includes the subjects of ballistics and sea-coast engineering, electricity, mines and mechanisms, artillery, coast-defense, chemistry, and explosives, special courses including customs and usages of service, property returns, correspondence, regulations, etc. A branch of this same institution is the school for electrician-sergeants, under the management of the officer in charge of the artillery school.

FOREIGN ARTILLERY SCHOOLS. France, Germany, England, and Italy have artillery schools, some of which have been established for over 200 years. An artillery school was established in Venice as early as 1515. Louis XIV. established a school of application for the artillery at Douai in 1679. This was in 1802 transferred to Metz, where it remained till the war of 1870. It is now at Fontainebleau. The artillery and engineering school of Prussia is at Berlin. The artillery and engineering school of England is at Woolwich. In some of the countries the artillery and engineers' schools are combined, but in most of the European States a separation of the two arms is made.

ARTILLERY TRAIN. A certain number of cannon mounted on carriages, with all their furniture, fit for marching. See FIELD ARTILLERY; ARMY ORGANIZATION; ARTILLERY; SIEGE GUNS; and TACTICS, MILITARY.

AR'TOCAR'PUS. See BREAD-FRUIT TREE.

ARTOIS, är'twä' (from *Atrebates*, Lat. name of a Gallic tribe). A former province of France, bounded by Flanders and Picardy, almost corresponding to the modern Department of Pas-de-Calais. The capital of Artois was Arras. Louis IX., in 1237, made Artois a county, and gave it to his brother Robert, who was succeeded by his son, Robert II., who died in 1302. Afterwards it passed into the control of Flanders and Burgundy, but was ceded to France by treaties in 1659 and 1678. It is a fertile district, yielding grain and hops, and vegetables, with abundant pasturage.

ARTOIS, COMTE D'. The title borne by Charles X. (q.v.) before his accession to the throne of France, and resumed by him after his abdication.

ARTOIS, JACQUES. See ARTHOIS, JACQUES.

ARTÔT, är'tō', MARGUERITE-JOSÉPHINE-DÉSIRÉE MONTAGNEY (1835—). A Belgian mezzo-soprano. She was born at Paris, July 21, 1835, studied under Pauline Viardot-Garcia, and made her début at Brussels in 1857. The next year she appeared at the Opera House in Paris, but left there to make a tour of France, Belgium, and Holland. Her success was immediate, and after 1860 she appeared in opera in London, Saint Petersburg, and the capitals of the Continent, her repertory including parts in operas by Mozart, Rossini, Verdi, Gounod, etc. In 1869 she was married to the Spanish barytone, Padilla.

AR'TOTYPE. See Photography.

ARTS, Liberal, or Seven Liberal. The distinction between the liberal arts and the practical arts on the one hand, and philosophy on the other, originates in Greek education and philosophy. In the *Republic* (Bk. xi.) of Plato, and the *Politics* (viii. 1) of Aristotle, the 'liberal arts' are those subjects that are suitable for the development of intellectual and moral excellence, as distinguished from those that are merely useful or practical. The distinction was always made, by the Greek theorists, between music, literature in the form of grammar and rhetoric, and the mathematical studies, and that higher aspect of the liberal discipline termed philosophy. Philosophy was sometimes called the liberal art *par excellence*. Philo of Judæa, in his attempt to harmonize Hebrew religious literature and Greek philosophy by allegorical interpretation, takes this relationship of the arts and philosophy as the meaning of the union of Abraham with Hagar and Sarah, the former typifying the liberal arts, the latter typifying philosophy. No definite number was ever assigned to the liberal arts by the Greeks, though the distinction later indicated by the terms *trivium* and *quadrivium* is clearly drawn in the *Republic* of Plato. Varro (B.C. 116-28) reproduces the distinction and the substance of the various 'liberal arts' for the Romans, though he includes medicine and architecture, both practical subjects, excluded alike by Greek and by Mediæval thought. Quintilian (A.D. 35-95) discusses five arts, grammar, rhetoric, music, geometry, and astronomy; but with the subdivision of the first and fourth, there would be added dialectic and arithmetic. By the Fifth Century the number of arts is definitely recognized as seven, both by the churchman Augustine and the pagan Martianus Capella. Cassiodorus, in the Sixth Century, applies the term *quadrivium* to arithmetic, geometry, music, and astronomy; probably before that time the term *trivium* had been applied to grammar, rhetoric, and dialectic, to indicate the trinity of the subject rather than simply their elementary character. By the time of Alcuin, in the Eighth Century, a sacred significance is attached to the number seven, and the Church appropriates this organization of human or pagan learning, to which at first it had been extremely hostile. Throughout the Middle Ages the 'seven arts,' as combined into the *trivium* and *quadrivium*, represent the sum of human learning. Dante, in his *Il convito* (Bk. II.), identifies them with the seven planetary circles of the heavens, and discovers in each planet the characteristic excellence of the appropriate study. The 'Seven Liberal Arts' formed the curriculum of the early universities, and their mastery entitled one to the degree of *bachelor*, or *master* 'in arts.' For the greater portion of the Middle Ages philosophy had simply been the inclusive term, but with the development of the universities it was recognized as a higher discipline. The Renaissance broke down even this limitation, and hereafter knowledge was no longer confined to these definite and narrow limits. For a survey of the significance of the term liberal arts, consult: *Aristotle and Ancient Educational Ideals* (New York, 1897); and also an article on which this is based, by A. F. West, *Princeton College Bulletin* (1890). See Degree; Diploma; University; Philosophy.

ART SQUARE. An ingrain carpet woven in one piece. See Carpet.

ART STU'DENTS' LEAGUE. The Art Students' League, of New York, the most prominent school of design in America, was founded in 1875 by certain students from the National Academy of Design, who felt the need of study from life and a broader field of work than that more conservative institute could give them. It was incorporated in 1878, and has since then risen steadily in importance. The annual membership is now more than 1000, and the daily attendance in its classes averages 400 pupils, of whom three-fourths are women. The quarters of the League is the Fine Arts Building, on Fifty-seventh Street. The League is self-supporting: the students' fee of from $30 to $70 maintains it in a state of independence. Only artists are allowed on the board of control, though these may be elected from among the students. The requirements of entry to the life, artistic anatomy, and antique classes, which are under the control of well-known artists, are the drawing of a full-length figure from life or a cast; and to the portrait class, a portrait from life. In addition to these there are classes in still-life, illustration, composition, and architecture, in connection with mural painting and decorative design. Those wishing to enter the illustration and composition class must submit an original design. The school year includes night classes for men, and a summer term with sketch and summer classes. Besides scholarships from some of the smaller art schools in other cities, there are prize scholarships of free tuition in all important classes. The following prizes are distributed during the year: A prize of $50 for work done in portrait class; the Evans prize of $50 for encouragement of the practical side of art; the Milhau prize for composition and illustration; and the Saltus prize for drawing. At the Paris Exposition of 1900, the League obtained a gold medal in the Department of Decorative Arts.

ARTUSI, är-too͞'sê, Giovanni Maria (c.1550-1613). An Italian musician, composer, and writer on musical theory. He was born at Bologna, was a canon of San Salvatore, Venice, and stanchly defended the musical traditions and views of his time against the innovations of Monteverde and Gabriel. He published a *Canzonette*, for four voices, and a *Cantate Domino* (Vincenti collection). His theoretical works include the *L'arte del contrappunto ridotto in tavolo* (1586 and 1589), *Delle imperfezioni della musica moderna* (1600 and 1603), *Impresa del zarlino* (1604), and *Considerazioni musicali* (1607).

ARUBA, ä-ro͞o'bå. An island of the Dutch West Indies, situated at the entrance to the Gulf of Venezuela, west of Curaçao, of which it is a dependency. It has an area of 69 square miles, and has a population of over 1000. The surface is elevated and scantily watered. The island contains deposits of phosphate, which constitutes an important article of export. The capital is Oranjestadt, on the southwestern coast, which contains the bulk of the population.

A'RUM (Lat., Gk. *ἄρον*, *aron*, wake-robin, cuckoo-pint). A genus of monocotyledonous plants of the order Araceæ. Most of the species are tropical or semi-tropical. They are characterized by a convolute spathe inclosing the spa-dix, which is naked at top and bears the pistillate flowers at its base. The staminate flowers are placed just above the base. In some of the species the spathes are highly colored and beautiful. These flowers are well known under the name 'callas.' A common species in England is *Arum maculatum*, where it is known as cuckoopint, wake-robin, etc. In the United States there are a number of closely related genera, of which may be mentioned the Indian turnip (*Arisæma triphyllum*), the water arum (*Calla palustris*), and the skunk cabbage (*Symplocarpus fœtidus*). The latter is well known for its fetid odor. An allied form, *Anthurium andreanum*, from Colombia, South America, with a large, brilliant, orange-red spathe, is often cultivated. Consult A. L. P. and C. Decandolle, *Monographiæ Phanerogamarum*, Vol. II. (Paris, 1878-79). For illustration, see Anemone; and Calla.

ARUNDEL, ăr′ŭn-del. A small municipal borough of Sussex, England, situated on the navigable river of Arun, about five miles from the coast. It has an old parish church, dating from the end of the Fourteenth Century; but its chief interest centres in Arundel Castle, the former seat of the Earls of Arundel, which consists of an old Norman keep and a newly restored Gothic building. It was besieged twice during the Twelfth Century, and utterly ruined during the civil war of Charles I. It is now the residence of the Dukes of Norfolk. Population, in 1891, 2644; in 1901, 2738.

ARUNDEL, Thomas (1353-1414). Archbishop of Canterbury in the reigns of Richard II., Henry IV., and Henry V. He was born in Arundel Castle, Sussex, the present seat of the Dukes of Norfolk, and was the third son of Robert Fitz-Alan, Earl of Arundel and Warren. He became Archdeacon of Taunton (1373) by the Pope's appointment, and Bishop of Ely, in August of the same year. In 1388, he was, by the same authority, transferred to the archiepiscopal see of York. He was Lord High Chancellor of England from 1386 to 1389, and from 1391 to 1396. In 1396 he was promoted by a Papal bull to the archiepiscopal see of Canterbury. Having been banished the kingdom (1397) for taking a leading part in the first attempt which was made to deliver the nation from the oppression of Richard II., he was honorably received at Rome, and at first favored by the Pope, Boniface IX. (1389-1404), but prejudiced by the representations of Richard II., he deprived him of his see and transferred him to Saint Andrews in Scotland. He did not return till 1399, and then was reinstated at Canterbury. He crowned Henry IV. October, 1399, and served as his lord chancellor for a few days, again in 1407 and 1412. He was conscientiously a bitter persecutor of the Lollards, the followers of Wiclif, and a chief instrument in procuring the horrible act for the burning of heretics (*de heretico comburendo*), passed in the reign of Henry IV. (1401). He even carried his bigotry so far as to solicit from the Pope a bull for digging up Wiclif's bones, which, however, was wisely refused him. He also procured a synodal constitution, which forbade the translation of the Scriptures into the vulgar tongue. Among others whom he caused to be convicted of heresy was Lord Cobham, one of the principal patrons of the new sect, at the commencement of the reign of Henry V., whose execution, however, did not take place till 1417. He died at Canterbury, February 19, 1414.

ARUNDEL, Thomas Howard, Earl of (1592-1646). An English art-collector, the first to make any large assemblage of works of art in England. He was born at Finchingfield (Essex), studied at Trinity College, Cambridge, in 1617 was appointed a privy councillor of Scotland and Ireland, and in 1621 earl-marshal of England. In 1636 he executed an important diplomatic mission at the court of Vienna. He is best known for his collections of books and of works of the fine arts, including busts and statues, gems, and inscribed marbles. It is with these last, widely known as the 'Arundel Marbles' (q.v.), and in particular with that called the Marmor Chronicon, or Parian Chronicle, that his name is chiefly connected.

ARUNDEL HOUSE. (1) The famous London house of Lord Arundel, situated where Arundel, Howard, Norfolk, and Surrey streets now unite at the Strand. Here the Arundel marbles were placed when first exported by their new owner from Italy. During the turbulent times of Charles I. and Cromwell, it was often deserted, and the splendid statuary in its gardens was partially destroyed. (2) The house of Lord Arundel, in which Lord Bacon died in 1626. It stood near Highgate.

ARUNDEL MAR′BLES. The inscribed marbles in the collection of ancient sculptures and antiquities formed about the beginning of the Seventeenth Century by Thomas Howard, Earl of Arundel, and presented in 1667 to the University of Oxford, by his grandson, Henry Howard, afterwards Duke of Norfolk. The collection was formed for the Earl largely through the purchases of Mr. (afterwards Sir) William Petty, who traveled in Italy, Greece, and Asia Minor for this purpose. The most important inscription is the 'Parian Chronicle,' a slab of marble containing a large part of a chronicle of events in Greek (chiefly Athenian) history. It originally extended from the reign of Cecrops, here reckoned as B.C. 1582, to B.C. 264, but the Arundel copy breaks off at B.C. 355. In 1897 another fragment, covering the period from B.C. 336 to B.C. 299 was found on Paros. The unknown writer not only gives the Athenian archon in whose term the events recorded took place, but also the number of years before B.C. 264. This inscription, with others of the collection, was first published in *Marmora Arundelliana*, by John Selden (1628), later in *Marmora Oxoniensia* by Prideaux (Oxford, 1676), Chandler (Oxford, 1763), and Roberts (Oxford, 1791). The best edition is that of Boeckh, with full Latin commentary, in *Corpus Inscriptionum Græcarum* (Berlin, 1828-77). The new fragment is published in *Mitteilungen des kaiserlich deutschen archäologischen Instituts, Athenische Abteilung*, Vol. XXIV. (Berlin, 1897).

The nobleman whose name is associated with these ancient marbles is worthy of remembrance, independently of his general merits, as the first of his order in England who liberally encouraged the fine arts, and communicated the influence of his own taste and enthusiasm in their cultivation to a wide circle of imitators and successors.

ARUNDEL SOCI′ETY. A society founded in 1848 and named after the Earl of Arundel, the famous collector of the Arundel Marbles and one of the first great English patrons and lovers of the arts.

ARUN'DO. See Reed.

ARUWIMI, ä'rōō-wē'mē. An important tributary of the Congo (q.v.), rising west of the Albert Nyanza, East Africa (Map: Congo Free State, E 2). It flows westward through a densely wooded region toward the Congo, forming numerous rapids and receiving the Repoko from the right. It enters the Congo in latitude 1° 10' N., after a course of nearly 800 miles. It is navigable to Jambuja, and assumes in the course of its flow the names of Ituri and Bijerre. Stanley ascended the Aruwimi in 1887 in his expedition in search of Emin Pasha.

ARVAK, är'vȧk (early awake). In Norse mythology, one of the horses of the sun. The other was called Alsvid (all-scorching).

AR'VAL BROTH'ERS (Lat. *Fratres Arvales*, from *arvum*, a field, arable land). A Roman priesthood of twelve members, whose duty it was to offer public sacrifices to insure the fertility of the fields. The place of their annual meeting was discovered near Rome in 1570, and since then large portions of their records, originally inscribed on slabs inside the temple of Dea Dia, have been recovered, including a list of magistrates from B.C. 2 to A.D. 27. The records end in A.D. 241, and may begin as early as B.C. 21. The college does not seem to have been of importance during the later Republic, but to have been raised to importance by the Emperor Augustus, who was a member, as were his successors, until Gordian III. The members were elected for life by the college, usually on nomination of the Emperor. The officers were a *magister* (master) and a *flamen;* and among the attendants were four boys, who were required to be the sons of senators, and to have living parents. Each officer wore a wreath of green, a white fillet, and a white toga bordered with purple. The great annual festival under their charge was in honor of Dea Dia, an otherwise unknown goddess, who must have originally resembled Tellus and Ceres. It occupied three days, between the middle and end of May, and was celebrated with an elaborate ritual. On the first day was the ceremony of 'touching' samples of old and young grain; on the second the sacrifice of two white pigs, a cow, and a fat sheep, in a sacred grove beyond the city, followed by blessing or 'touching' samples of grain, and after that the dance and song of brotherhood in the temple, and the election of officers for the coming year. On the third day, there was a sacrifice in the city. They seem also to have taken part in the ancient Ambarvalia, which are perhaps identical with their May festival. Other important duties of the brothers were to offer sacrifice on the birthday of an emperor, or at the beginning of a consulate, or for escape from danger, or at the starting or ending of a journey, or on occasion of any important event touching the Imperial family. On the third or fourth of January they recited a particular form of prayer for the ruling Emperor, and made sacrifice to the Capitoline deities. Consult: Henzen, *Acta Fratrum Arvalium* (Berlin, 1874) and *Ephemeris Epigraphica* (Rome, 1872-99).

ARVE, ärv. A tributary of the Rhône, 62 miles long, situated in the Department of Haute-Savoie, France (Map: Switzerland, A 2). It rises on the Col-de-Balme (over 7000 feet high), in the Canton of Valais, Switzerland, and flows southwest through the Val-des-Bagnes and the celebrated valley of Chamonix, emptying into the Rhône at an elevation of over 1100 feet above the sea. The Arve is very swift and turbulent; and, as it is fed by glaciers, it often overflows its banks, and is even the chief cause of the rises in the river Rhône itself. The district watered by the Arve contains many pleasure resorts and much fine scenery. The chief towns of interest are Servoz, Saint Gervais-les-Bains, which has sulphur baths, and Sallanches.

ARVEYRON, är'vā'rôɴ'. A tributary of the Arve in the Department of Haute-Savoie, France, rising in the Alps, 4400 feet above sea-level, as the outlet of the Mer-de-Glace in Chamonix (q.v.). Other tributaries of the Arve bear the name Arveyron, and are further distinguished by the addition of the names of the glaciers from which they take their source.

ARWIDSSON, är'vēd-son, Adolf Ivar (1791-1858). A Swedish poet, born at Padasjoki, Finland. In 1817 he was appointed *docent* in history at the University of Åbo; but his outspoken criticism of the acts of the authorities, in an essay contributed to a journal, the *Mnemosyne*, resulted in his banishment from Finland in 1822 and his removal to Stockholm, where he became director of the Royal Library (1843-58). His publications include a collection of poems, *Ungdoms Rimfrost* (1832); a collection of Swedish folk-songs, entitled *Svenska Fornsånger*, 3 vols. (1834-42); and a translation of the Icelandic *Frithjof's Saga* (2d ed., 1841).

ARYABHATTA, är'ya-b'hät'tȧ, (476-550). A Hindu astronomer, born at Pataliputra (mod. Patna, on the Upper Ganges). He was known to the Arabs as Arjehir, and his writings had considerable influence on Arabic science. His only work known to us is the *Aryabhattiya*, a series of rules and propositions written in verse, and so called after his own name. This was published in Sanskrit, and edited by Kern at Leyden in 1874. It is divided into four parts, entitled respectively: "Celestial Harmonies," "Elements of Calculation," "On Time and Its Measures," and "Spheres." Of the second part, Rodet has published a translation (Paris, 1879). Aryabhatta held that the earth rotates upon its axis, and he gave the correct explanation of eclipses of the sun and the moon. In mathematics he could solve the quadratic equation, but many of his geometric formulas were incorrect.

ARYAN, är'yan *or* ăr'ĭ-an. The name commonly employed to designate that group of languages and that branch of the human family to which formerly the appellation Caucasian or Japhetic, as opposed to Semitic, was popularly but inaccurately given. It is synonymous in general with the terms Indo-Germanic, Indo-European, or Indo-Celtic. German philologists commonly employ the term Indo-Germanic in its stead, and on good grounds they restrict the name Aryan to the sense of Indo-Iranian, that is, to the Indian and Iranian branches of the great Indo-European family of languages and the early national communities which these languages represent. It can be proved, for example, that in ancient times the inhabitants of India and Persia proudly styled themselves Aryans, and there is no doubt that the term was a national designation in their case. In the oldest hymns of India, the Rig-Veda, Aryan (*ārya*) is employed as a national epithet of the members of the ruling people of Northern India, as opposed to the Dasyus, the Gentile or subject races, and especially the darker-skinned inhabitants of the south. The Avesta (q.v.) divides countries into Aryan and non-Aryan (*airya, anairya*), and from *airya* comes the later form of the name *Erān* or *Irān*, and also the classical Ariana (see IRANIANS). In the old Persian inscriptions, Darius boasts of being "an Aryan and of Aryan descent" (*ariya ariya ciθra*, Inscr. Naqshi Rustam, a 14).

The etymology of the word *ārya, airya, ariya*, is obscure, and the real meaning of Aryan is uncertain. In the older Sanskrit, *aryá, ārya* seems to denote 'true,' 'loyal,' and 'good'—in reference, perhaps, to those of the true stock, the real people, the loyal. In later Sanskrit *ārya* means 'noble.' Such explanations as 'plowmen,' 'tillers of the soil' (cf. Lat. *arare*, to plow), taken to denote an agricultural population in contradistinction to a nomadic tribe, have little to recommend them. Moreover, while Aryan, in the sense of Indo-Iranian, is well authenticated in antiquity, little success has followed the attempt to prove that Aryan was used in primitive times by the people themselves as a broad and general designation, in the sense in which philologists and anthropologists have employed it. At present the name is given to a family composed of eight great groups of European and Asiatic peoples, whose languages are as follows: (1) Indian and Iranian; (2) Armenian; (3) Greek; (4) Albanian; (5) Italic; (6) Celtic; (7) Germanic; (8) Balto-Slavonic. (See these titles.) As a linguistic and ethnologic term, Aryan, both in Europe and in the United States, is beginning to give place to the preferable terms Indo-European or Indo-Germanic. Indo-Celtic, as a designation instead of Aryan, has not had much vogue; but it is sometimes employed as a substitute for Indo-Germanic, especially by the French, who use also Indo-European. As a convenient term, however, for general usage, Aryan has much in its favor, and it will doubtless survive as an alternate to the more precise designations.

That the Aryan peoples had their primitive home in the Pamirian region of the Hindu-Kush, was formerly the commonly received theory; but of late years the evidence is more in favor of the location of the home of the Aryans somewhere between the Caspian and the North Sea, or rather in the steppe land of Southern Russia (S. Schrader, 1890, 1901). Brinton (1890) made the Aryans a West European development of the white race (primitively from northern Africa); Keane (1896) placed the Aryan cradle-land somewhere in the Eurasian steppe area. Others, like Deniker (1900) and Sergi (1895-1901), prefer to speak of the Aryanization of prehistoric dwellers in Europe (from Asia ?). In any case, the Aryan is a very ancient dweller in both Asia Minor and Central Asia, and the Aryan element in the culture of the south Asiatic peoples is both old and far-reaching. Aryan savagery and Aryan culture are both well represented in Asia. Consult: Schrader, *Prehistoric Antiquities of the Aryan Peoples*, trans. by Jevons (London, 1890), and *Reallexikon der indogermanischen Altertumskunde* (Strassburg, 1901); Taylor, *Origin of the Aryans* (New York, 1890); Reinach, *L'Origine des Aryens* (Paris, 1892); Ripley, *Races of Europe* (New York, 1899); Sergi, *Mediterranean Races* (1901), and the works listed by him. See INDO-GERMANIC LANGUAGES; INDO-EUROPEANS.

ARZAMAS, är′zȧ-mäs′. The capital of the district of the same name, in the Government of Nizhni Novgorod, Russia (Map: Russia, F 3). It is situated on the high right bank of the Tesha River at its juncture with the Arsha, an affluent of the Volga, about 80 miles from Nizhni Novgorod, and 340 miles east of Moscow. Arzamas has tanneries, brick-yards, and tallow factories. Population estimated at 10,600. Arzamas was noted in the first half of the Nineteenth Century for its school of painting, whose products supplied a great part of Russia with holy pictures.

AS (Lat.). The designation both of a Roman weight (called also *libra*), corresponding very nearly to an English *pound*, and also of a coin made of the mixed metal *æs*, or bronze. The *as* (coin) originally no doubt weighed a (Roman) pound; but it was gradually reduced to 1-36 of a pound, and even lower. It is thus difficult to assign any fixed value to the *as*. About B.C. 270, the *denarius* (= 17c.) contained 10 asses; so that the value of the *as* was a little less than one and three-quarters cents; when 16 asses went to the denarius, the value was about one cent. It was by the *sestertius* (q.v.) that money was reckoned at Rome. The oldest form of *as* usually bore the figure of an ox, a sheep, or other domestic animal (*pecus*); from which it is usually supposed that the Latin word for money, *pecunia*, is derived.

A'SA, son of Abijah (II. Chron. xiv. 1) and the third king of Judah. He began his reign as a religious reformer by removing the idolatrous altars and breaking the images (II. Chron. xiv. 3). He next turned his attention to the fortifications of the land, building walls and towers (II. Chron. xiv. 6). With the help of a large army which he collected—the Chronicler puts it at 580,000 men, which is surely too large a figure—he was able to defeat Zerah, the Ethiopian King (II. Chron. xiv. 8-12). On his return from this glorious victory he was met by Azariah, the son of Oded, who preached a new religious reform. Azariah's preaching strengthened Asa in his work, and he removed the traces of idolatry from Judah and Benjamin. He even removed his mother, Maacah, from power because she had made an idol to Ashera (I. Kings xv. 13; II. Chron. xv. 16). For a time Asa had peace in the country, but war broke out between him and Baasha, King of Israel. Against this king, Asa asked and secured the help of Benhadad, King of Syria. For this step he was severely rebuked by Hanani, the seer. The King, in anger, imprisoned the prophet (II. Chron. xvi. 7-10). For the last two years of his reign Asa was afflicted with a disease of the foot. He died and was buried in the city of David (II. Chron. xvi. 13; I. Kings xv. 23-24) with great solemnity. The duration of his reign may be fixed approximately at B.C. 917-876.

ASABA, ȧ-sä′bȧ. A town of southern Nigeria (q.v.), Africa, situated on the Niger about 150 miles from the coast (Map: Africa, E 4). It was the administrative headquarters of the Royal Niger Company, and is the seat of the Supreme Court.

A'SA DUL'CIS (Neo-Lat. *asa*; cf. Pers. *azā*, mastic, Ar. *asā*, healing, and Lat. *dulcis*, sweet). A drug in high repute among the ancients as an antispasmodic and diuretic; also for supposed virtues of the most extraordinary kind, such as neutralizing the effects of poison, curing envenomed wounds, restoring sight to the blind, youth to the aged, etc. Its value was estimated by its weight in gold. The princes of Cyrene caused a figure of the plant producing it to be struck on the reverse of their coins, and it was sometimes called *Laser Cyrenaicum*. The plant is of the genus Thapsia (of the natural order Umbelliferæ). It is a native of the south of Europe and of Barbary.

AS'AFŒT'IDA, or **ASSAFŒTIDA** (Lat., fetid asa or assa). A gum-resin, which has been supposed to be identical with the exuded juice of the *Silphion* of Dioscorides, so highly esteemed among the Greek physicians; but this, perhaps, was rather the *Asa dulcis* (q.v.). This drug is brought from Persia, Turkestan, and Afghanistan, and is procured by drying the milky juice which flows from the root of the *Ferula fœtida*. The root is long, and generally undivided; white inside, but having a black covering; and contains in its interior a quantity of juice of an overpowering odor, which much resembles that of garlic. About April the root-leaves are taken away, and the root itself is more or less exposed by removal of the soil from about it. After a lapse of six weeks, a slice is cut horizontally from its summit and a thick white juice exudes, the smell of which even exceeds in strength that of the drug when dry. The drug is sometimes met with in the market in the form of tears, but more frequently in lumps, which are made up of irregularly shaped tears, agglutinated together by a softer substance. Asafœtida is used in medicine, and possesses stimulant, carminative, and antispasmodic properties. It is most useful in minor hysteria, and from its carminative action, in tympanitis or distention of the intestines with gas. When taken internally it undergoes absorption, and may be detected in almost every secretion of the body, as the saliva, breath, and urine. It is composed mainly of resin and gum, with a few per cent. of oil of garlic and a small amount of ferulaic acid. In many parts of the East asafœtida is used as a condiment.

ASAM, ä'säm. A family of Bavarian artists. HANS GEORG (died 1696) prepared several oil paintings and frescoes for the churches at Munich, Benediktbeuren, and Tegernsee. He later gave instruction in architecture at Prague. His sons, COSMAS DAMIAN (1680-1742), painter, and ÆGIDIUS QUIRINUS (died c.1746), sculptor and worker in stucco, studied at Rome, and settled at Munich about 1715. They completely remodeled the cathedral of Freising, and decorated the monasteries of Maria-Einsiedeln and Metten and the Church of Saint Emmeram, at Ratisbon. They built the so-called Congregation Hall at Ingolstadt, and at their own expense constructed the church of Saint John, besides their dwelling in Munich, which building, with its numerous fantastic features, is in some respects one of the most striking specimens of the baroque style of architecture in Germany.

ASAMA-YAMA, ȧ-sä'mȧ-yä'mȧ. The largest active volcano in Japan (8280 feet high), situated in about 138° 30' eastern longitude, and 36° 25' northern latitude. Its last eruption occurred in 1783, and caused the destruction of several villages and of a primeval forest. Since then its activity has been manifested largely in showers of ashes and stones. Its crater is circular in shape, and measures about three-fourths of a mile in circumference.

A'SAPH. The eponym of a guild of singers in the Second Temple, who may have superintended the musical part of the worship as early as the time of Nehemiah (Neh. vii. 44). Afterwards they shared this work with the 'Sons of Korah.' When the Korahites became porters and doorkeepers, the Asaphites were supplemented by the guilds of Heman and Ethan. The Chronicler, deeming it essential that the musical organizations of the temple should consist of Levites, represents Asaph, Heman, and Ethan as descendants of Gorshon, Kohath, and Merari (I. Chron. vi. 33-47). Psa. l., lxxiii.-lxxxiii., are attributed to Asaph, and consequently belonged to a hymn-book used by this choir.

AS'APHUS (Gk. *ἀ*, *a* priv. + *σαφής*, *saphēs*, clear, distinct). An Ordovician genus of smooth trilobites, often of large size, among the members of which there is manifested a tendency to lose that longitudinal lobation which is so peculiarly characteristic of the trilobites as a group. The large head-shield has the central portion or glabella indistinctly limited, and is provided with two reniform compound eyes which in some species are placed upon immovable stalks that, rising far above the general surface of the head, enable the animal to command a view of the entire horizon. This latter arrangement is of interest when considered in connection with the nature of the joint that connected the head with the thorax, this joint having in all trilobites been so constructed as to prevent any lateral motion of the head-shield, a slight vertical motion only having been possible. The thorax has eight segments, and the tail-shield, of a size somewhat less than that of the head, is generally quite smooth and nonsegmented.

The allied genus Megalaspis has a head of elongated triangular form, with the anterior and lateral angles produced into sharp spines. Another allied genus, Niobe, which appeared at a somewhat earlier age than did Asaphus, has the longitudinal lobation quite well marked, and seems to indicate the form of the stock from which Asaphus was evolved through a gradual loss of the trilobation and segmentation of the carapace. These three genera, together with four others of less importance and over 150 species, comprise the family Asaphidæ, which is found abundantly in all portions of the Ordovician system in Europe and North America. See ORDOVICIAN; TRILOBITA; and for illustration see plate accompanying TRILOBITA.

ASAR, ä'sär, **OSAR**, ō'sĕr, or **OESAR**, ē'sär. Variations on the Swedish Osar. The same as Esker (q.v).

AS'ARABAC'CA (Lat. *asarum*, Gk. *ἄσαρον*, *asaron*, asarabacca + Lat. *bacca*, berry), *Asarum europæum*. A plant of the natural order

Aristolochiaceæ, a native of Europe, growing in woods; rare, and perhaps not truly indigenous, in Great Britain. The whole plant has acrid properties; the roots and leaves are aromatic, purgative, and emetic. The use of Asarabacca, however, as an emetic has been much superseded by that of Ipecacuanha, which is milder and safer. The powdered roots and leaves enter into the composition of cephalic snuffs, which cause sneezing, and are employed as a counter-irritant in cases of headache, ophthalmia, toothache, etc. The plant contains a volatile oil and a crystalline substance called *asarin*, to which it seems to owe its active properties. The genus Asarum is distinguished by twelve horned stamens, distinct from each other and from the style, and by a bell-shaped three-lobed perianth. *Asarum europæum* has a very short stem, with two shining kidney-shaped leaves on long stalks, from the axil of which springs a single drooping greenish-purple flower. A nearly allied species, *Asarum Canadense*, a native of the United States, is stimulant and diaphoretic, and is used under the name of Canada Snakeroot, instead of *Aristolochia serpentaria*. It is also called Wild Ginger and used as a spice, being of a warm aromatic quality, and not acrid like its European congener.

AS′ARUM. See Asarabacca.

ASBEN, äs-bĕn′. See Air.

ASBES′TIC. A name given to a mixture of second-grade asbestos and serpentine, obtained as a by-product in asbestos mining. The material is crushed and mixed with lime to form a light, strong, fireproof wall-plaster, which can be given an excellent finish.

Asbes′tolith is a somewhat similar material, made from short-fibred asbestos, used for flooring and fireproofing. See Asbestos.

ASBES′TOS (Gk. *ἄσβεστος*, inextinguishable, incombustible, from *ἀ*, *a* negat. + *σβεννύναι*, *sbennynai*, to extinguish). A fibrous mineral, used chiefly for protection against heat, its structure permitting it to be matted or woven. The asbestos of commerce belongs to two mineral species—viz., true asbestos and chrysolite. The former is a variety of amphibole (q.v.), closely allied to tremolite, actinolite, and hornblende. It is a silicate of magnesia and lime together, and iron-oxide and its fibres are sometimes combined together in a compact mass, sometimes easily separable, elastic, and flexible. It is generally of a whitish or greenish color. The variety known as *Rock-cork*, resembling vegetable cork, is soft, easily cut, and lighter than water. *Rock-leather* and *Rock-wood* are varieties of true asbestos, somewhat similar to *Rock-cork*, but not so light. Chrysolite, the second mineral called asbestos, is a fibrous variety of serpentine, a silicate of magnesia. The Italian product is true asbestos, Canadian asbestos being chrysolite. The finest variety of asbestos, with easily separable fibres, is called amianthus (Gk. unpollutable). Amianthus cloth was indestructible by fire, and was used by the ancients to enwrap dead bodies placed on the funeral pile, in order to preserve the ashes of the body. Asbestos deposits of commercial value occur in Italy, Tasmania, New South Wales, Canada, and the United States. Asbestos is now employed for boiler coverings, for the radiating surfaces of heating apparatus, as an absorbent in lamps, as an insulator in electric mechanisms, and for a great many other purposes in connection with manufactures, such as making paint, which forms an almost fireproof coat that protects wood against sparks and small flames. Cloths made of asbestos are used for curtains in theatres, for firemen's clothing, etc. Made into a lining felt, asbestos serves as a good insulator for heat, and has great value for packing steam ducts, pistons, hot-air joints, etc. Asbestos paper and board is made in much the same manner as ordinary paper and pasteboard, by reduction of the mineral to pulp, and subsequent pressing, drying, etc. The asbestos produced in Canada is almost pure white, and has long fibres. It can be spun into fine thread and woven into rope or yarn. Although the properties of asbestos were known to the ancients, and even to some extent utilized by them, the substance has been extensively employed for practical purposes only in recent times. Most of the American supply of asbestos is obtained from Canada. See the articles Amphibole; Serpentine; and Asbestic; and consult Jones, *Asbestos, Its Properties and Uses* (London, 1890); article on "Asbestos" in *Mineral Industry*, Vol. VI. (New York, 1897).

ASBJÖRNSEN, äs-byẽrn′sen, Peter Christen (1812-85). A distinguished Norwegian student of folk-lore and zoölogy, born at Christiania. He studied at Christiania University, and taught for several years. He made long journeys on foot for scientific purposes, in the course of which he collected popular tales and legends, which, in coöperation with his friend Jörgen Moe, the future Bishop of Christiansand (1838), he published, and later several times supplemented (*Norwegian Folk Tales*, 1842-44; *Norwegian Fairy Tales and Folk Legends*, 1845). His scientific researches earned him traveling stipends at intervals from 1846 to 1853. He then studied forestry, and held various official positions in connection with the forest and turf industries from 1860 to 1876, when he was pensioned. He made several important discoveries in deep-sea soundings, and wrote on zoölogy and other scientific subjects; but this side of his work is quite overshadowed by work in folk-lore, which shows literary talent and much originality. He did not, like the Grimms and Arnason, aim merely at reproduction, but retold the stories in settings that illustrated the life and mental horizon of the people, with exquisite bits of natural description that found immediate and wide recognition.

ASBOTH, ŏsh′bōt, Sándor (Alexander) (1811-68). A Hungarian-American soldier. After fighting under Kossuth (1848-49), he accompanied him to America in 1851, and became a citizen of the United States. During the Civil War he commanded divisions under Frémont and Curtis, as brigadier-general, and was seriously wounded at the battles of Pea Ridge (March 7-8, 1862) and Marianna (September 27, 1864). He resigned with the brevet rank of major-general (August, 1865), and was United States Minister to the Argentine Republic (1866-68), where he died of his wounds.

ASBURY, ăz′bẽr-ĭ, Francis (1745-1816). The first bishop of the Methodist Episcopal Church ordained in the United States. He was born at Hamstead Bridge, 4 miles northwest of Birmingham, Eng., August 20 or 21, 1745. He obtained rudimentary education in a village school; at 18 became a local preacher; at 21 was received by Wesley into the itinerant ministry; and on October 27, 1771, landed in Philadelphia as a missionary in America. It was but three years after the building of the first Methodist church in the country, and there were only about 600 persons of the faith, chiefly in Philadelphia and New York. When the Revolution began, Asbury sympathized with the people, and while Mr. Rankin, who was the ecclesiastical superior, returned to England, Asbury remained; though, like many other nonjurors, he was subjected to suspicion, and at one time to imprisonment. After about two years of surveillance, the authorities concluded that the scruples of Asbury were not political, but religious, and he was permitted to go free. He improved his opportunity, and when the war closed there were 83 Methodist ministers at work, and the membership reached 14,000. In 1784 the several societies were organized into an Episcopal Church, and Asbury and Thomas Coke were elected, by the conference in Baltimore, Md., 1784, joint superintendents. The title bishop was substituted later, which called out a rebuke from Wesley, who, however, approved of Asbury's superintendence. Thenceforward his life was devoted to preaching and the supervision and extension of churches. His labors were incessant, and his biography is itself a good history of the growth of Methodism in America. He never married, lest a wife should distract attention from his great work. He was always poor and always generous. In 1785 he laid the foundation for the first Methodist college, and afterwards formed an educational plan for the whole country, by making districts with at least one classical academy in each. He was rather stout, of medium height, with a fresh countenance and a penetrating eye. Wesley alone was his superior as a practical worker and organizer, and the two were alike in zeal and spirit. During his ministry it is estimated that Asbury traveled more than 270,000 miles, visiting every part of the country; preached more than 16,000 sermons; ordained over 4000 ministers, and presided at 224 conferences. It is largely due to the labors of this indefatigable apostle that Methodism in America owes its excellent organization and wonderful growth. He died at Spottsylvania, Va., March 31, 1816. His only written works were his journals (New York, 1852), which are personally and historically of great value. For his biography, consult W. P. Strickland (New York, 1858), and Smith (Nashville, 1896).

ASBURY (ăz'bĕr-ĭ) **PARK.** A city in Monmouth County, N. J., on the Atlantic Ocean, just north of Ocean Grove, from which it is divided by Wesley Lake. It is 6 miles south of Long Branch, on the Pennsylvania Railroad and the Central Railroad of New Jersey (Map: New Jersey, E 3). It is one of the most popular watering-places on the Atlantic Coast. It has a fine opera house and summer cottages. A board walk extends for a mile along a fine beach. Wesley Lake, Deal Lake, and Sunset Lake are attractive. The sale of liquor is prohibited. Asbury Park was founded in 1869, incorporated in 1874, and chartered as a city in 1897. The government is vested in a mayor, biennially elected, and a city council, the board of education being elected separately by the people. The water-works are owned and operated by the municipality. Population, in 1900, 4148.

ASCAGNE, ȧs'kän'y'. A character in Molière's comedy, *Le dépit amoureux*, who is substituted for her dead brother of the same name and habited in his garments, but who later falls in love with Valère and marries him secretly.

AS'CALON. A city of Palestine. See ASHKELON.

ASCALON. The sword of Saint George, mentioned in Richard Johnston's *Seven Champions of Christendom*, a romance printed in 1596.

ASCANIO, ȧs-kä'nē-ō. (1) In Fletcher and Massinger's *The Spanish Curate*, the tender son of Don Henriques. (2) In Massinger's *Bashful Lover*, the name assumed by Maria, Octavia's daughter, to tally with her disguise as a page. (3) In *The Assignation*, by Dryden, a page.

ASCA'NIUS, called also Iulus, the son of Æneas, and mythical founder of the family of the Cæsars. It is in the disguise of Ascanius that Cupid, in Vergil's *Æneid*, implants the flame of love for Æneas in Dido's breast.

AS'CAPART. The name of a giant, 30 feet high, often referred to by Elizabethan writers. He appears in the romance *Bevis of Hampton*, where he is conquered by the hero.

AS'CARIS (Gk. *ἀσκαρίς*, *askaris*, a worm in the intestines). A genus of intestinal nematode worms, which are of comparatively large size. The body is thick, and the mouth is usually surrounded with three lips or cephalic valves, one in a dorsal position and the other two in the median neutral line. Species of Ascaris are found parasitic in man, pigs, sheep, calves, horses, dogs, cats, etc. The members of the species are commonly known as stomach worms. Their presence in the intestines of animals does not cause pronounced symptoms of disease unless the worms occur in large numbers. They may then produce reflex nervous disturbances and epileptic attacks. Since these worms are not attached by means of hooks or otherwise to the walls of the intestines, they may be expelled by the administration of cathartics and vermifuges in liberal quantities. The best-known species is the round-worm (q.v.), the equally well-known pin-worm (q.v.) being placed in a closely allied genus. Another species (*Ascaris megalocephala*), much larger than the preceding, is found in the intestine of the horse. It is sometimes as large around as a lead pencil, and has a noticeably large head. It is of especial interest to biologists, because it was upon the eggs of this species that the German scientist Boveri made his notable observations regarding cell-division and the behavior of the chromosomes. Another interesting species (*Ascaris nigrovenosa*) is found in the lungs of frogs and toads, where it is a hermaphrodite; but from its fertilized eggs unisexual worms arise, which live in damp, muddy earth. The females are viviparous, but give birth to not more than four young, which find their way into a frog or toad and there grow into the adult hermaphroditic form, thus completing the cycle. For an account of these worms in the human body, see WORMS.

ASCEND'ANT (Lat. *ad*, to + *scandere*, to climb). In astrology, the easternmost or rising star in a horoscope is in the ascendant, or 'house of life.' It was deemed to have the most influence on destiny, or to give the strongest indication of the future; so it is said when one's prospects improve, "his star is in the ascendant."

ASCEN′SION (for origin of name, see below). An isolated volcanic island in the Atlantic, in latitude 7° 55′ S., and longitude 14° 23′ W., about 700 miles northwest of Saint Helena (Map: Africa, C 5). It has an area of 35 square miles, about one-half of which is under cultivation, and rises to an elevation of 2870 feet in Green Mountain, on which a sanitarium for sailors has been erected. The island, which belongs to Great Britain, is under the direct control of the Admiralty, and is used as a coaling and victualing station for the British Navy. Population, mostly consisting of officers and seamen, is reported to be over 400. The island was discovered by the Portuguese in 1501 and named Conception Island. It was rediscovered on Ascension Day, 1508, when it received its present name. It was settled by the British in 1815, during Napoleon's stay on Saint Helena. Principal settlement, Georgetown.

ASCENSION, Right (Lat. *ascensio*, an arising; Ger. *gerade Aufsteigung*). The name given in astronomy to one of the factors which determine the position of a heavenly body in the sky, the other being the declination. The vault of the sky is to be regarded as divided into a northern and southern hemisphere by the celestial equator, just as the earth is divided by the terrestrial equator. The location of a heavenly body is then defined by means of right ascension and declination, just as that of a city on the earth is fully known from its longitude and latitude. Right ascension is thus quite analogous to longitude on the earth. The initial point for measuring right ascension is one of the points of the celestial equator where it is intersected by the ecliptic (q.v.), and this point is called the vernal equinox, or first point of α Aries (q.v.). The right ascension of a heavenly body is then defined as the angular distance measured on the celestial equator from the vernal equinox to the foot of a perpendicular circle let fall on the equator from the heavenly body. The right ascension is ascertained by means of the transit instrument and clock. The transit instrument enables us to observe its meridian passage, and the transit clock gives the time at which this takes place. This clock is set so that when the first point of Aries is in the meridian it stands at 0 hours, 0 minutes, and 0 seconds, and it is so arranged as to indicate 24 sidereal hours, the time that elapses between two successive passages of that point. The reading of the clock at the passage of any heavenly body then enables us to calculate that body's right ascension. The right ascension of all the fixed stars down to about the ninth magnitude has been thus determined and published in printed star catalogues.

ASCENSION DAY, or Holy Thursday. One of the great religious festivals of the Episcopal and also of the Roman Catholic Church. It is held on the fortieth day after Easter, and is intended to commemorate the ascension of Christ into heaven. It is one of the six days occurring in the year for which the Church of England appoints special psalms, and the same Church also particularly recommends it as a fitting day for the receiving of communion. No mention of its celebration occurs before the Fourth Century, though Saint Augustine believed it to have been instituted either by the Apostles themselves, or the primitive bishops succeeding them. Connected with the religious observances of this day were certain civic ones, which in some parts of England and Scotland are continued to this day, viz., *beating the bounds*, or *riding the marches*, though their religious connection is apparently forgotten. See Rogation Days; and Perambulation of Parishes.

ASCET′ICISM. Among the Greeks. ἄσκησις, *askēsis*, denoted the exercise and discipline practiced by the athletes or wrestlers, who had to harden their bodies by exertion, and to avoid all sensual and effeminating indulgences. In the schools of the philosophers, especially of the Stoics, the same word signified the practice of mastering the desires and passions, or of severe virtue. In these senses it passed into the language of the early Christians. The essence of asceticism is to hold self-denial and suffering to be meritorious in the sight of God, as a means to perfect the moral nature and to rise to spiritual heights not otherwise attainable. It had been a common practice among both the Pagans and the Jews before the coming of Christ. It has been practiced in all ages of the Church, and during the Middle Ages it generally took the form of monasticism. But it is not characteristic of Protestantism, and even in the Roman Catholic Church ascetic practices have been modified in recent times; fastings are less rigorous, and the ancient severity of conventual life has been moderated in some degree. See Monasticism.

ASCH, äsh. A town of the Austrian crownland of Bohemia. It is situated at the foot of the Hainberg, about 2000 feet above the sea-level, 13 miles northwest of Eger, and near the Bavarian and Saxon frontiers (Map: Austria, C 1). It has manufactures of woolen and mixed silk and woolen goods, particularly stockings. There are also machine works, and bleaching and dyeing establishments. Population, in 1890, 15,557; in 1900, 18,700.

ASCHAFFENBURG, ȧ-shä′fen-burK. The capital of the Bavarian district of Lower Franconia, on the right bank of the Main, at its junction with the Aschaff (latitude 50° 1′ N., longitude 9° 7′ E.), about 23 miles east-southeast of Frankfort (Map: Germany, C 4). It is built upon an eminence, and has both a healthful and attractive situation; but the streets are narrow, irregular, and slope steeply toward the river. The castle of Johannisburg, built between 1605-14, by Johann Schweikard, of Kronberg, elector of Mainz, contains a collection of paintings and engravings and a fine library. Besides the collegiate church, the military barracks, and the town hospitals, Aschaffenburg possesses a Roman villa, built by King Louis I., in imitation of the Castor and Pollux edifice discovered at Pompeii. Among its educational and charitable institutions are a gymnasium, a *real-schule*, two seminaries, a music school, and two orphan asylums. It is the burial-place of the poets W. Heinse and K. Brentano. The town is celebrated for its manufacture of colored papers, besides carrying on a considerable trade in wood, building stone, tobacco, wine, etc. Population, in 1890, 13,275; in 1900, 18,091, principally Catholics. Aschaffenburg existed as early as the invasion of Germany by the Romans, who built a castle here. In 974 it came into the possession of the archbishops of Mainz, and remained with them until the dissolution of the Germanic Empire. The Concordat between the Pope and the German nation was prepared at Aschaffenburg in 1447. In 1814, along with the principality of which it is the capital, it was ceded to Bavaria by Austria.

ASCHAM, ăs′kam, ROGER (1515-68). A distinguished English writer and classical scholar, born at Kirby Wiske, in Yorkshire. He received his early education at home under the direction of his father and in the family of Sir Anthony Wingfield, and in 1530 entered Saint John's College, Cambridge, where he took his degree of M.A. in 1537. The study of the classics, especially Greek, had recently been revived at Cambridge, and Ascham's bent impelled him with ardor to these studies. His reputation as a classical scholar soon brought him numerous pupils, and there being at that time no Greek chair, he was appointed by the University to read Greek lectures. At first he opposed the newly introduced method of pronunciation, which is still used in England, but afterwards adopted and defended it. His leisure was devoted to music, penmanship, in which he excelled, and archery. In defense of the latter art he published, in 1545, a treatise, entitled *Toxophilus*, the pure English style of which, independently of its other merits, ranks it among the classical pieces of English literature. For this treatise, which was dedicated to Henry VIII., he was rewarded with an annual pension of £10, equivalent to about $500 of our present money. In 1546 he was appointed university orator; and in 1548, on the death of his former pupil, Grindal, he was called to supply his place as master of languages to the Princess Elizabeth. In this office he gave the highest satisfaction, but at the end of two years abruptly resigned it because of a quarrel with the steward of the household. That he did not lose favor at court, however, is manifest from his having soon after been appointed secretary to serve Richard Morysin, ambassador to the court of Charles V. He spent three years in Germany and in Italy, and on his return published the diary he had kept during his travels. The interest of Gardiner, Bishop of Winchester, secured his appointment as Latin secretary to Queen Mary; his pension also was doubled. His prudence and moderation preserved him from offending by his Protestantism. After the death of Mary, Elizabeth retained him at court as secretary and tutor, posts which he held till his death, in 1568. His second important work, *The Schoolmaster*, a treatise on classical education, was published in 1570 by his widow. Consult: *The Collected Works of Ascham*, ed. J. A. Giles (London, 1864-65); *Toxophilus*, ed. Arber (London, 1868); *The Schoolmaster*, ed. Mayor (London, 1863); and the reprint by Arber (1870); and Katterfeld, *Roger Ascham, sein Leben und seine Werke* (Strassburg, 1880).

ASCHBACH, äsh′bäG, JOSEPH VON (1801-82). A German historian, born at Höchst, near Frankfort-on-the-Main. He held the professorship of history at Bonn (1842-53) and at the University of Vienna (1853-72). In 1870 he was ennobled. Among his works are *Geschichte der Westgoten* (1827); *Geschichte der Omajjaden in Spanien* (2 vols., 1829-30; 2d ed. 1860); *Geschichte Kaiser Sigismunds* (4 vols., 1838-45); and *Roswitha und Konrad Celtes* (1867), in which he maintained that the panegyric of the Emperor Otho the Great, which was ascribed to the nun Roswitha, had been written by Konrad Celtes during the Sixteenth Century. This assertion was disproved by Waitz and by Köpke. Consult R. Köpke, *Ottonische Studien* (1869).

ASCHERSLEBEN, ä′shĕrs-lā′ben. A town in in the Prussian Province of Saxony. It is situated on the river Eine, 32 miles south-southwest of Magdeburg (Map: Prussia, D 3). It has considerable manufactures of woolens, linens, earthenware, tinware, chemicals, etc., and breweries, iron foundries, mills, etc. There are also coal and salt mines, and extensive truck gardens. Population, in 1890, 22,893; in 1900, 27,245. Aschersleben is mentioned in the Twelfth Century, and was probably founded in the Eleventh. It became Prussian in 1813.

ASCHERSON, ä′shĕr-zōn, PAUL FRIEDRICH AUGUST (1834-). A German botanist, born in Berlin. He studied medicine and natural science, and in 1873 was appointed professor of botany at the university there. In 1873-74 he accompanied Rohlfs in his expedition to the Libyan desert, which he again visited alone two years later. His principal contributions are on the subject of the flora of Europe and of Africa. His published works include: *Flora der Provinz Brandenburg* (Berlin, 1864), and a *Synopsis der mitteleuropäischen Flora* (Leipzig, 1896).

ASCIANS, ăsh′yanz, or ASCII, ăsh′ĭ-ī (Gk. ἀ, *a* priv. + σκιά, *skia*, shadow). People near the Equator, who have the sun over their heads, and consequently have no visible shadow, twice a year.

ASCID′IAN (Gk. ἀσκίδιον, *askidion*, dim. of ἀσκός, *askos*, a skinbag, a bladder), or TUNICATE (Lat. *tunicatus*, clothed with a tunic). One of the small marine animals, constituting the class Urochorda of the phylum Chordata, and popularly known as sea-squirts. They are of two kinds: (1) Fixed and individual ones, to which the name ascidian is more properly applied; and (2) compound free-swimming ones, more properly designated as tunicates. Their principal interest is the evidence they show of affinity with the vertebrates by the presence in their larval conditions of a notochord and other fundamental characteristics of the chordata. See Plate of ASCIDIANS AND BALANOGLOSSUS.

The larva at first are free-swimming, and resemble a tadpole. The tail is fringed with a delicate transversely striated fin; in the axis of the tail is the notochord, and above it the central nerve-cord, which anteriorly is dilated, and still farther forward again expands into a vesicle, which is a true sense-organ—a primitive eye. The enteric canal exhibits a mouth, a pharynx, œsophagus, stomach, and intestine; and there is a heart and blood circulation. After a few hours of existence in this stage, so suggestive of an embryo vertebrate, it becomes fixed by adhesive papillæ upon its 'head'; its 'tail,' including the notochord, disappears, the nervous system diminishes to a single ganglion, the body takes the form of a dilated sac, with an incurrent and excurrent orifice side by side at the outer end, the reproductive organs develop, and a purely vegetative existence within such protection as is given by a leathery, contractile tunic, takes the place of the promising condition of early youth. There is, however, a minute animal swimming about on the surface of the sea, named Appendicularia, which seems to belong here, and is like an ascidian larva, which preserves its chordate condition throughout life.

These simple, solitary ascidians are bi-sexual, and increase only by spawning; but the composite tunicates form colonies by budding, as well as emit eggs, and the economy of some of these communities is very complicated. See Balanoglossus; Chordata; and articles under Alimentary System, Evolution of; Nervous System, Evolution of; and similar titles, for Comparative Anatomy and relationships of the class. Consult Parker and Haswell, *Text-Book of Zoölogy* (New York, 1898).

Explanation of Plate of Ascidians, etc.

1. A SIMPLE ASCIDIAN: *a*, mouth; *b*, exhalent pore.
2. A CREEPING FORM (Clavellina), showing stolons.
3. SAME AS No. 2: *a*, mouth; *b*, branchiæ; *c*, nervous centre; *d*, stomach; *e*, genital gland; *f*, exhalent pore; *g*, anus; *h*, stolons.
4. PORTION OF BRANCHIÆ, enlarged.
5. AN ENCRUSTING COMPOUND ASCIDIAN (Botrylloides).
6. DIAGRAM OF PART OF 5, showing structure; the arrows indicate inward and outward water currents.
7. COLONY OF FREE LUMINOUS ASCIDIANS (Pyrosoma).
8. ASCIDIAN EMBRYOS (tadpole stage), showing changes of form with growth, and disappearance of notochord (*noto*); *a*, youngest full-swimming tailed stage; *b*, larva recently fixed; *c*, older fixed stage; *d*, section of tail of *a*, showing relation of fins to notochord.
9. BALANOGLOSSUS: *br*, branchial region; *co*, collar; *gen*, genital ridges; *hep*, prominences formed by hepatic cæca; *pr*, proboscis.
10. Enlarged section of upper part of 9: *prob*, proboscis; *div*, supposed notochord (diverticulum); *mo*, mouth; *dors*, dorsal-vessel.

ASCLE′PIADA′CEÆ (named after *Asclepias*). The milkweed family. A natural order of dicotyledonous plants, the members of which are herbs or shrubs, often with twining stems, and mostly with a milky juice. The leaves are entire and without stipules. The flowers, which are commonly produced in umbels, are peculiar in structure, but perfectly symmetrical and regular. The calyx is small or none; corolla five-parted, the lobes often reflexed; a crown of five-hooded bodies is seated upon the tubes of the stamens, each containing a curved horn; stamens five, inserted upon the corolla; pollen grains coherent into two or four waxy masses, somewhat as in some orchids; ovary of two carpels, styles short and united by their disk-shaped stigma. Fruit of two follicles or pods; seed usually flattened and provided with long, fine hairs; embryo about as long as the seed; cotyledons flat.

This order, which is closely related to Apocynaceæ, embraces more than 200 genera, and nearly 2000 species, which are widely distributed throughout the warmer portions of the globe, being especially numerous in Africa. The principal representative of the order in the United States is the well-known Asclepias (q.v.), or milkweed. The main sections of the order are Periplocheæ, represented by the genera Periploca and Streptocaulon; Asclepiadeæ, which includes Asclepias and Cynanchum, including Vincetoxicum; Tylophoreæ, of which the chief genera are Marsdenia, Stephanotis, Ceropegia, Stapelia, and Hoya; and Gonolobeæ, represented by Gonolobus. The plants of this order vary widely in their characteristics and uses. Many are cultivated for their delightful perfume, as *Stephanotis floribunda*, etc., while others, such as some species of Stapelia and Hoya, are known as carrion-flowers, from their repellent odor. Flies are attracted by them, and eggs are often deposited upon the flowers. Some species of Asclepias yield fibre from their stems, and the silky fibre of their pods has many uses. Others yield valuable fibre. Among them are species of Marsdenia, Periploea, and Orthanthera. For the economic uses of others see Indian Sarsaparilla; Mudar; Argel; Cynanchum.

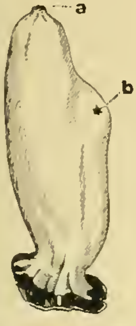
AS′CLEPI′ADÆ (Gk. *Ἀσκληπιάδαι*, *Asklēpiadai*). Originally an association, claiming descent from the god of healing, Asclepius, or Æsculapius (q.v.), in which the practice of medicine was hereditary. Later those not connected by blood were admitted, and the organization, which existed in various parts of Greece, became a training-school for physicians. After the time of Hippocrates, the Asclepiadæ seem to have required a comprehensive course of study of their candidates, and the so-called Hippocratic Oath shows the ethical standard they maintained.

ASCLEPIADES, ăs′klė-pī′ȧ-dēz (Gk. *Ἀσκληπιάδης*, *Asklēpiadēs*). A Greek physician, born at Prusa or Cius, in Bithynia. He lived at the beginning of the First Century B.C. He was at first a teacher of oratory at Rome, but later, without any previous preparation therefor, turned to the practice of medicine. What Asclepiades lacked in real knowledge, he supplied by clear-sightedness and understanding of human nature. He aimed to effect his cures by simple and pleasant remedies. Thus, he made unlimited use of wine, recommended frequent baths, dieting, and exercise, while he denounced the excessive use of emetics and purgatives. One of his leading doctrines was, that all disease arose from an inharmonious distribution of the small, formless corpuscles of which the body is composed. He is said to have been the first to distinguish between acute and chronic diseases, but his knowledge of anatomy was apparently slight. Seventeen treatises of Asclepiades are mentioned. The fragments of his writings, which have been preserved, were edited by Gumpert, *Asclepiadis Bithyni Fragmenta* (Weimar, 1798).

ASCLEPIADES of Samos. A Greek poet of the Second Century A.D., a younger contemporary of Theocritus. He was the author of thirty-nine epigrams, mostly erotic, in the Greek anthology. The Asclepiadean metre probably was named after him.

ASCLE′PIAS (so named from *Asclepius*, father of medicine), or Swallow Wort. A genus of the order Asclepiadaceæ, most of the species of which are natives of America, where they are commonly called milkweeds, on account of the milky exudation that occurs at any part cut or injured. The numerous seeds contained in the pods are copiously covered with down, and are dispersed by the wind. The milky juice of some species is said to contain caoutchouc, or a substance resembling it. The corolla is wheel-shaped, and reflexed with a corona of variously

ASCIDIANS AND BALANOGLOSSUS



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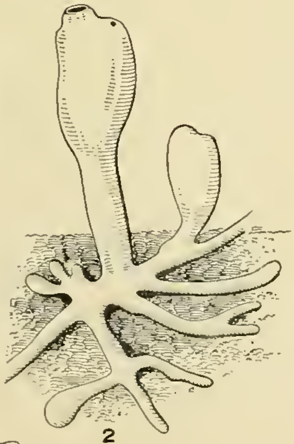

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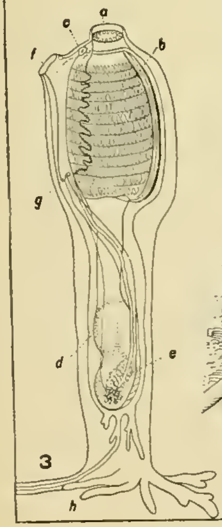

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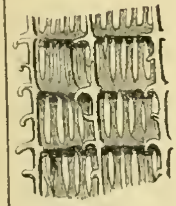

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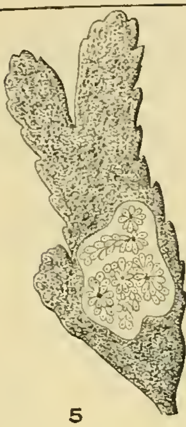

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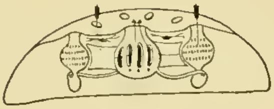

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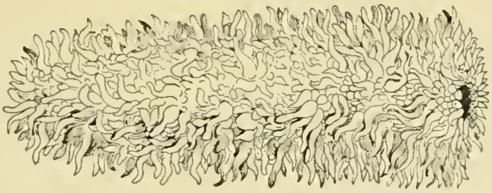

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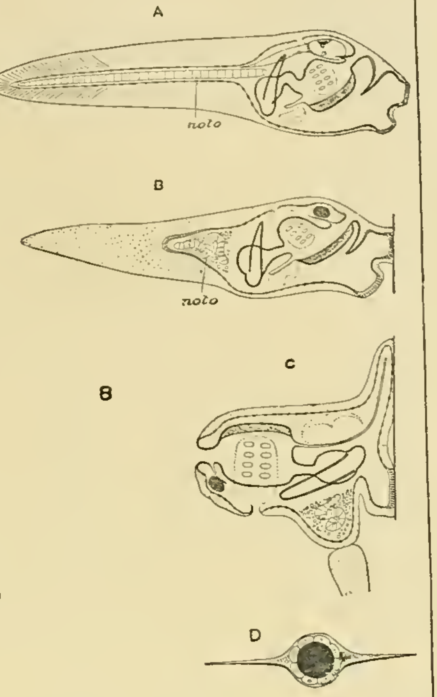

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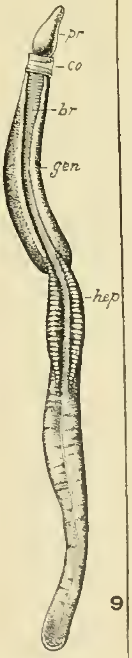

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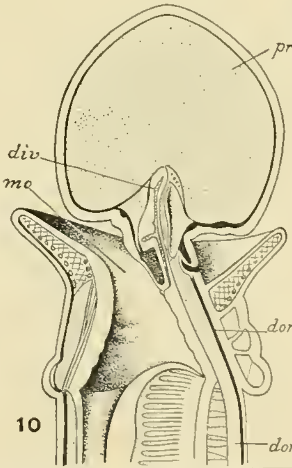

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1-6. ASCIDIANS.
7. PYROSOMA.

8 ASCIDIAN EMBRYOS.
9-10. BALANOGLOSSUS.

For explanation of details, see articles "Ascidian" and "Balanoglossus."

hooded appendages. The fibre of the stem of some species is strong and has been used for making ropes; the lint in the pods has been used for pillows and similar purposes. It is fine and silky, but, not having the twist of the cotton fibre, cannot be used for spinning. Asclepias cornuti, or Asclepias syriaca, and Asclepias tuberosa, pleurisy root, are among the best known. The name of the genus was given on account of the medicinal virtues of the plants, which are sudorific, expectorant, and carminative. The young shoots are sometimes used as a substitute for asparagus, to which they bear some resemblance. A few fossil-leaves from rocks of Tertiary age at Kumi, Greece, have been referred to the genus Asclepias.

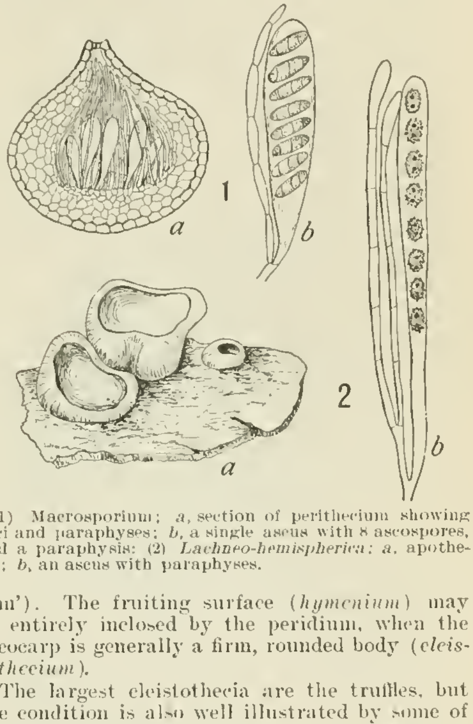
ASCLE′PIUS. See Æsculapius.

ASCOLI, äs′kō-lē, Graziadio Isaia (1829—). An Italian philologist of European celebrity, and one of the pioneers in modern methods of comparative linguistics. He was born of a wealthy Jewish family at Görz, in the Austrian province of that name, July 16, 1829. Trained by his father for a business career, he pursued his linguistic studies without masters, and at the age of fifteen gave evidence of exceptional talent by publishing a paper upon the relation between Wallachian and the Friuli dialect. His first important work, *Studi orientali linguistici* (1854), established his reputation and led to his appointment in 1860 to the chair of philology at the Accademia Scientifico-Letteraria of Milan. In addition to his academic work, he found time to issue a number of important volumes, including *Studi critici* (2 vols., 1861-77); *Corsi di glottologia* (Turin, 1870); and his most notable work, *Saggi ladini* (1872), which marked an important advance in the study of Romance philology, and was the forerunner of the monumental *Archivio glottologico italiano*, which under his editorship became the receptacle of the most important contributions made by him and by his pupils to the study of Celtic and Italian dialects. The numerous honors bestowed upon Ascoli testify to the wide recognition of his talents. He became a member of the Institute of France, of the Academies of Vienna, Budapest, Berlin, and Saint Petersburg, was elected to the Italian Senate in 1888, and successively chosen as delegate of Italy to the Oriental congresses at Berlin, London, and Geneva.

ASCOLI PICENO, äs′kō-lē pē-chä′nō (Lat. *Asculum Picenum*). A city of the Province of Ascoli Piceno, in Central Italy, on a hill beside the Tronto, 73 miles southwest of Ancona by rail (Map: Italy, H 5). A branch railway, 19 miles long, connects it with an inferior harbor on the Adriatic, and with the Bologna-Brindisi Railway. The public buildings are beautiful, and constructed chiefly of marble; almost all traces of the ancient Asculum Picenum have disappeared. Ascoli manufactures majolica-ware, glass, wax, silks, leather, hats, and cloth, and is commercially very active. Population, in 1881, 11,200 (commune, 23,225); in 1901 (commune), 28,882.

ASCOLI SATRIANO, sä′trē-ä′nō. A city and episcopal see in the Province of Foggia, southern Italy, 20 miles south of Foggia by rail. It is the ancient Asculum Apulum, celebrated as the scene of the defeat of the Romans by Pyrrhus, B.C. 279. Population, in 1881 (commune), 9906; in 1901, 8550.

AS′COMYCE′TES (Gk. *ἀσκός*, *askos*, skin-bag + nom. pl. *μύκητες*, *mykētes*, mushrooms, fungi). One of the largest groups of Fungi, only rivaled in the number of species by the Basidiomycetes (mushrooms and their allies). Its members are readily distinguished by the characteristic fructification called the 'ascocarp.' The essential elements in an ascocarp are small, delicate sacs, called 'asci.' Each ascus generally contains eight spores, called 'ascospores.' There may be only a few asci in an ascocarp, or they may be numbered by the thousand. The asci are usually arranged in a flat or concave layer, packed in among parallel sterile hyphæ ('paraphyses'), and around the fruiting surface is a variously modified envelope ('peridium'). The fruiting surface (*hymenium*) may be entirely inclosed by the peridium, when the ascocarp is generally a firm, rounded body (*cleistothecium*).



(1) Macrosporium; *a*, section of perithecium showing asci and paraphyses; *b*, a single ascus with 8 ascospores, and a paraphysis: (2) *Lachneo-hemispherica*: *a*, apothecia; *b*, an ascus with paraphyses.

The largest cleistothecia are the truffles, but the condition is also well illustrated by some of the mildews (e.g. the lilac mildew) parasitic on the surface of the leaves of many herbs and shrubs. A very large number of Ascomycetes grow on decaying wood, or as parasites under the bark, and form hard black fructifications, an excellent example of which is the 'black knot' (Plowrightia) of plum and cherry-trees. In most of these forms the ascocarps are cavities termed 'perithecia,' opening to the exterior by a pore, and this type of ascocarp characterizes the group called Pyrenomycetes.

The most beautiful Ascomycetes, however, have a saucer or cup-shaped ascocarp (*apothecium*), the upper surface being the hymenium, and frequently brilliantly colored red, yellow, or brown. The most conspicuous of these cup fungi, called Discomycetes, are in the order Pezizales, and grow in the rich humus of moist woods. They are fleshy forms, and some species are large enough to be eaten. The saucer-shaped apothecium is also very characteristically illustrated in the lichens (q.v.), whose fungal portion, with few exceptions, are Ascomycetes.

PEZIZA, A CUP FUNGUS.

Some remarkable parasites (e.g. Cordiceps) that attack caterpillars and their pupæ are found here. The infected insect becomes mummified by the growth all through its interior of the fungus, which, finally breaking through some region of the body, forms a club-shaped or plumlike fructification.

One of the most highly developed of the Ascomycetes, and valued for its gastronomical qualities, is the 'morel' (*Morchella*), a representative of a specialized group called the Helvellales, whose members have large, stalked fructifications, with an exposed and frequently much convoluted hymenium. They are popularly regarded as mushrooms.

Another interesting Ascomycete forms the ergot (q.v.) of wheat. This is really a resting condition of the body (*sclerotium*), which gathers in the flower clusters of the wheat and transforms the ovary into a hard, black body. The ergot grain falls to the ground, and under suitable conditions of warmth and moisture becomes soft, putting forth a number of stalks with rounded heads, in which are embedded perithecia.

In certain cases the ascocarp is known to be the result of a sexual act. (See Fungi.) For an extensive account of the Ascomycetes consult: Engler and Prantl, *Die Natürlichen Pflanzenfamilien* (Berlin, 1899—in progress); and in English, Ellis and Everhart, *North American Pyrenomycetes* (Newfield, N. J., 1892); and Phillips, *British Discomycetes* (London, 1888).

ASCO′NIUS PE′DIA′NUS, Quintus (c.3-c.88 A.D.). A Roman critic and historian. He was born probably at Patavium, but lived mainly at Rome. During the reigns of Claudius and Nero he made a careful study of State papers then extant, and wrote his valuable historical commentaries on Cicero's Orations, of which only those on the five orations, "In Pisonem," "Pro Scauro," "Pro Milone," "Pro Cornelio," and "In Toga Candida," are preserved. These, too, are in a fragmentary condition. The commentaries, written in pure Latin, refer chiefly to points of history and antiquities, and contain interesting accounts of those constitutional forms of the senate, popular assemblies, and the courts of justice, which, under the Empire, were rapidly disappearing. The notes on the Verrine Orations are of a much more grammatical cast, and exhibit traces of a declining Latinity, so that though originally ascribed to Asconius, they are probably to be attributed to a grammarian of a later date. Consult: Madvig, *De Asconii Pediani Commentariis* (Copenhagen, 1828). Asconius is known to have written also a life of Sallust and a treatise against Vergil's critics, but these have been lost. See the text in C. G. Schultze's and Orelli-Baiter's editions of Cicero.

AS′COT HEATH. A famous English racecourse in Berkshire, 26 miles from London (Map: England, F 5). The annual meeting in June is attended by the fashionable and professional sporting public. It is believed to have been established in 1711.

ASCOT RA′CES. One of the most fashionable horse-races in England, held at Ascot Heath in Berkshire.

ASCUT′NEY (Ind., 'Three Brothers'). A mountain rising 3320 feet above the level of the sea in Windsor County, Vermont. It presents a fine example of a *monadnock* (q.v.). From its summit a beautiful view of the Connecticut Valley may be obtained. There are granite quarries at its base.

ASELLI, â-sĕl′lê, **ASELLIO**, â-sĕl′yô, or **ASEL′LIUS**, Gasparo (c.1581-1626). A celebrated Italian physician, professor of anatomy and surgery at Pavia. In 1623 he discovered the lacteal vessels. Before his time, anatomists had supposed that the chyle was carried from the intestines into the liver by the mesenteric veins. While dissecting a living dog, he noticed for the first time the multitude of little vessels which suck up the nutritive portion of the food. At first he mistook them for nerves, and did not pay particular attention to them; but on pricking one with the point of his scalpel, a white liquid spurted out, and the discovery flashed on him in a moment. He seems, however, never to have understood or described them with complete accuracy. In the year following his death a treatise on the subject of his discovery was published, entitled, *De Lactibus, sive Lacteis Venis*.

ASEN, ä′sen. The name of some of the Mediæval Bulgarian czars. John Asen I. (1186-95) liberated Bulgaria from the Byzantine yoke, conquered Sophia, and made Tirnova the capital of the realm. He was slain and the throne passed to his brother. John Asen II. (1218-41), a son of the former, fled in his youth to Russia, and later reconquered Bulgaria, which greatly improved under his rule. After the subjugation of the despot, Theodore of Epirus, who had assumed the title of Emperor of the East (1230), Asen conquered Albania and Macedonia, and with the aid of the Greeks of Nicæa besieged Constantinople, at that time (1235) in possession of the Latins. By his conquest of Albania he obtained access to the Adriatic Sea, and thus greatly extended the commerce of the country, which, under him, eventually attained a degree of prosperity equal to that which it had enjoyed under the great ruler Simeon.

AS′ENATH. The daughter of Potipherah, priest of On, wife of Joseph (Gen. xli. 45, 50; xlvi. 20). The name seems to be the Hebraized form of the Egyptian *ns-nt*, 'belonging to Neith.' Names of this type occur in the XXI. Dynasty, and become frequent in the XXVI or Saite Dynasty.

ASENATH, Life of. See Apocrypha.

ASEP′TICISM. See Antiseptics.

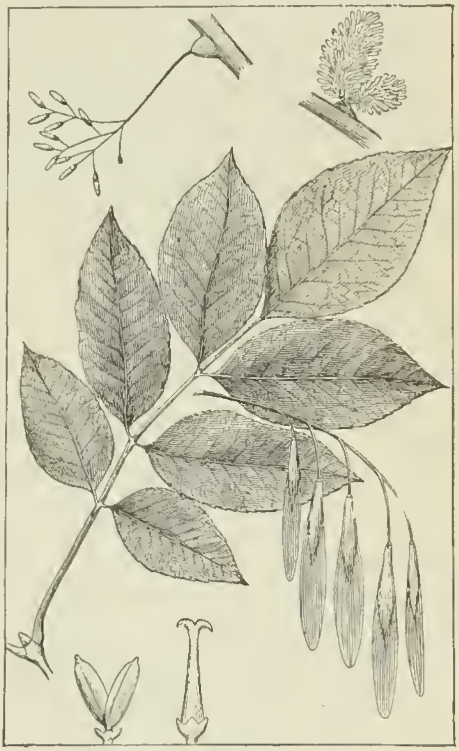
AS′ES. See Æsir.

ASGARD, äs′gärd (Old Norse *āss*, god + *gardhr*, garth, inclosure, home). The home of the Norse gods, or the Scandinavian Olympus.

It was said to stand in the middle and highest part of Ida's Plain, which is the centre of the universe. There the Æsir (gods) built a hall, *Glads-heim* (home of joy), with seats for twelve, and one high-seat for Odin, the All-father; and also a lofty abode called Vingolf, for the goddesses. The gods worked diligently, played at games, were rich in precious things, and happy until three maidens from Jötunheim, 'giants' world,' crossed the plain and entered Asaheim, when corruption began to spread among the inmates. Asgard had many mansions, the largest and noblest of which was Gladsheim, while another, not so large, but fairer and brighter than the sun, was called Gimli. The latter mansion will stand when heaven and earth shall have been destroyed by fire, and will be the dwelling-place of brave and upright men. There is an historical explanation of this myth: that Asaheim was a country east of the Don in Asia, where there was a city of Asgard, in which ruled a chief named Odin, or Woden; that Odin, fearing subjection by the Romans, led his people across Russia to Sweden and settled at Sigtuna (Upsala); that his priests or chief men founded other settlements, and established the worship of their ancestors; that in lapse of time the man Odin and his chiefs came to be looked upon as gods. No date can be settled for such a migration; but from B.C. 120 to 80 has been thought probable, for then Mithridates Eupater was defying the armies of Rome. This theory is based on the account in Heimskringle, which is, however, of doubtful value. See ÆSIR; and SCANDINAVIAN AND TEUTONIC MYTHOLOGY.

ASGILL, ăs'gĭl, JOHN (1659-1738). An eccentric English writer. He was born at Hanley Castle, Worcestershire, and studied for the bar. At intervals during the whole of his checkered life he practiced his profession in some form or other; but he was continually getting into financial and other difficulties. Fortunately for him, Parliament had just passed an act (1700) for the resumption of forfeited estates in Ireland, and commissioners were appointed to settle claims. Seeing his opportunity, he went to Ireland, and found the whole country wrangling in lawsuits. His talents, and the favor of the commissioners, secured to him a lucrative practice; and he even acquired sufficient influence to obtain a seat in the Irish Parliament. Some time, however, before taking his seat, Asgill had published a most extraordinary pamphlet, entitled: *An Argument Proving that, According to the Covenant of Eternal Life, Revealed in the Scriptures, Man May Be Translated Hence into the Eternal Life Without Passing Through Death, Although the Humane Nature of Christ Himself Could not thus Be Translated till He had Passed Through Death* (1700). The Irish Parliament voted the treatise a libel, and expelled the author. Asgill returned to England and entered the English Parliament in 1705 as member for Bramber, in Sussex. But the fame of his unlucky pamphlet at last proved a Nemesis; for the English House, resolving to be not less virtuous than the Irish one, took up the treatise, condemned it to be burned by the common hangman, as profane and blasphemous, and expelled Asgill (1707). After this his circumstances rapidly grew worse, until he finally found something like peace in the King's Bench and the Fleet, between which two places his excursions were confined for the remainder of his life. The famous pamphlet by which Asgill is remembered, was much praised by Coleridge for its irony. The case for man was, indeed, capitally argued in the terms of the English law. Asgill professed to believe that he was to be translated without dying. Consult the Gregg edition of the argument (New York, 1875), and Coleridge, *Table Talk*, April 30, 1832, reprint (London, 1883).

ASH (AS. *æsc*, MHG. *asch*, Ger. *Esche*), *Fraxinus*. A genus of trees belonging to the natural order *Oleaceæ*. The leaves are deciduous, and are pinnate, with a terminal leaflet. There are about 50 species, mostly natives of Europe, eastern Asia, and of North America. The Common Ash (*Fraxinus excelsior*) grows wild in the middle and south of Europe and in the north of Asia. It is an undoubted native of Great Britain. The flowers are naked; the leaves have five or six pair of leaflets. The flowers appear before the leaves in spring; indeed, the tree is not covered with leaves until the season is far advanced, and loses them again early in autumn. It is, however, a most beautiful and umbrageous tree, highly ornamental in parks; but in parks or hedgerows it is injurious to the grass or crops immediately around it. It rises to the height of 100 to 150 feet, generally with a smooth stem. The wood is white, tough, and hard, much valued by wheelwrights, cartwrights, coach-makers, joiners, and turners. It is also excellent for fuel. Sometimes it becomes irregular in the disposition of its fibres, and finely



ASH-TREE LEAF AND FRUITAGE.

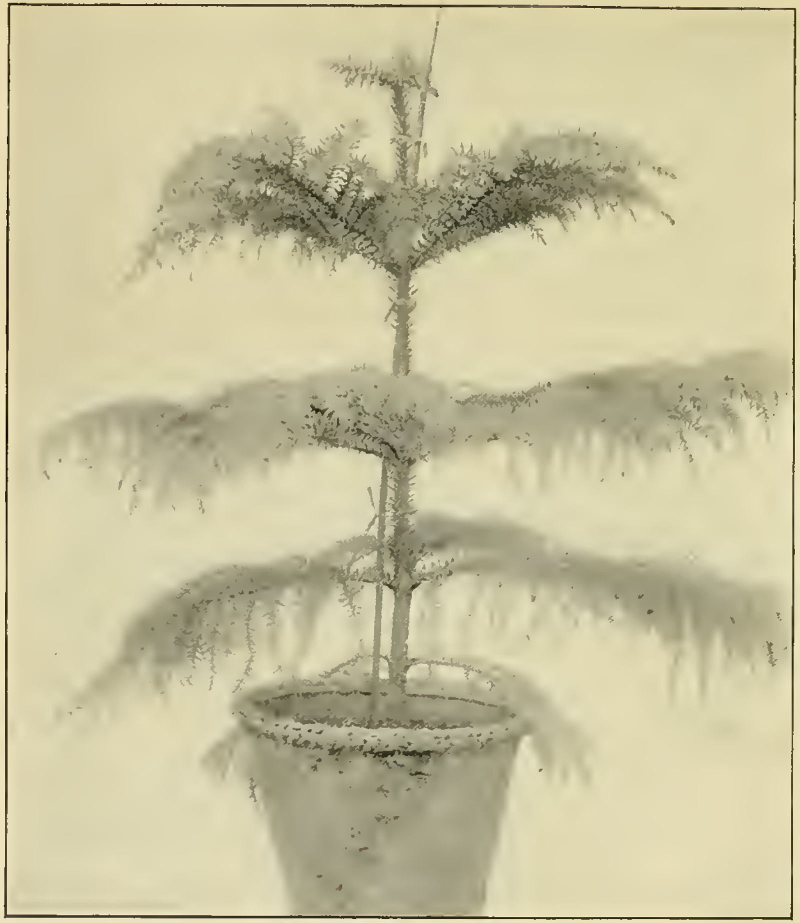
veined, and is then prized by cabinet-makers. The wood of the young trees is almost as valuable as that of the old. Indeed, the value of the timber is greatest in trees of which the growth has been rapid, as it exhibits the characteristic toughness in the highest degree. The ash prefers a loamy soil, but grows in almost any, and flourishes in situations too elevated or too exposed for most other trees. It has been extensively planted in elevated situations in some parts of the north of Scotland, and there, in the more sheltered glens, it grows to a large size. Cultivation has produced and perpetuated a number of varieties, of which the most remarkable are the *weeping* ash, with boughs bent almost straight down to the ground; the *curl-leaved* ash, with dark-green wrinkled or curled leaves; and the *entire-leaved* ash, a very curious variety, with many or all of the leaves simple (not pinnated), which has been erroneously regarded by some botanists as a distinct species, and named *Fraxinus simplicifolia*, *Fraxinus heterophylla*, etc. The small-leaved ash (*Fraxinus parvifolia*) and the Lentisk ash (*Fraxinus lentiscifolia*) are both natives of the shores of the Mediterranean, and are very graceful and ornamental trees. The American Ash, or white ash (*Fraxinus Americana*), is readily distinguished from the common ash by its lighter bark and paler green leaves. The leaves have a calyx, and the leaflets are shortly stalked and entire (those of the common ash are sessile and serrated). It is abundant in New Brunswick and Canada, but is rare south of New Jersey and west of Minnesota and Kansas. The trunk often rises more than 40 feet undivided. The wood is used for the same purposes as that of the common ash. The red ash (*Fraxinus pubescens* or *Fraxinus Pennsylvanica*) is very similar, but of smaller size, and has a deep-brown bark. It is most abundant in Pennsylvania, Maryland, and Virginia, especially in swampy ground. The black ash or water ash of the New England States, New Brunswick, etc. (*Fraxinus sambucifolia* or *Fraxinus nigra*), is a large tree, with buds of a deep-blue color. This tree is more commonly found in wet places than the other species. Its wood is soft, tough, and easily separable into thin layers, on which account it is commonly used for barrel hoops, staves, and for splint baskets, etc. The blue ash of Ohio, Kentucky, Tennessee, etc. (*Fraxinus quadrangulata*), is also a large tree. The inner bark of this species gives a blue color to water, hence the name. The branches are quadrangular, the young shoots having on the angles four membranes which extend their whole length. The green ash (*Fraxinus viridis* or *Fraxinus lanceolata*), readily recognized by the brilliant green of its young shoots, is chiefly found in the Middle States; on account of its hardness, the green ash is extensively planted for wind-breaks, and as an ornamental in Minnesota and the Dakotas. It is easily propagated from seed and is of very rapid growth. The wood is less valuable than that of the white ash and the Carolina ash (*Fraxinus Carolinia*), remarkable for the great size of its leaflets, chiefly in the Southern States. Besides these, North America produces about a dozen other species or varieties. The wood of all of them is used for somewhat similar purposes to that of the common ash. In the south of Europe grows the manna ash or flowering ash (*Fraxinus ornus*, called *Ornus Europæa* by some botanists), whose flowers have a four-partite calyx, and four small yellowish-white petals. The tree has much resemblance to the common ash. From it the substance called manna (q.v.) is obtained by means of transverse incisions in the bark; but in very favorable situations it flows spontaneously during the greatest heat of summer. Manna is chiefly collected in Calabria and Sicily. A nearly allied species, *Fraxinus rotundifolia*, a native of Greece and the Ionian Islands, yields it also in perhaps equal quantity. The common ash is said sometimes to produce the same exudation in the same warm climates.

The mountain ash is the Rowan Tree (q.v.), and belongs to a different natural order. Its resemblance to the ash is chiefly in its leaves. Fossil forms of the ash (*Fraxinus*) are known in all the Tertiary beds above the Eocene, in Europe, but have not been found in beds of equivalent age in North America. Consult: G. Nicholson, *Illustrated Dictionary of Gardening* (London, 1884-89); L. H. Bailey, *Cyclopædia of American Horticulture* (New York, 1900-01).

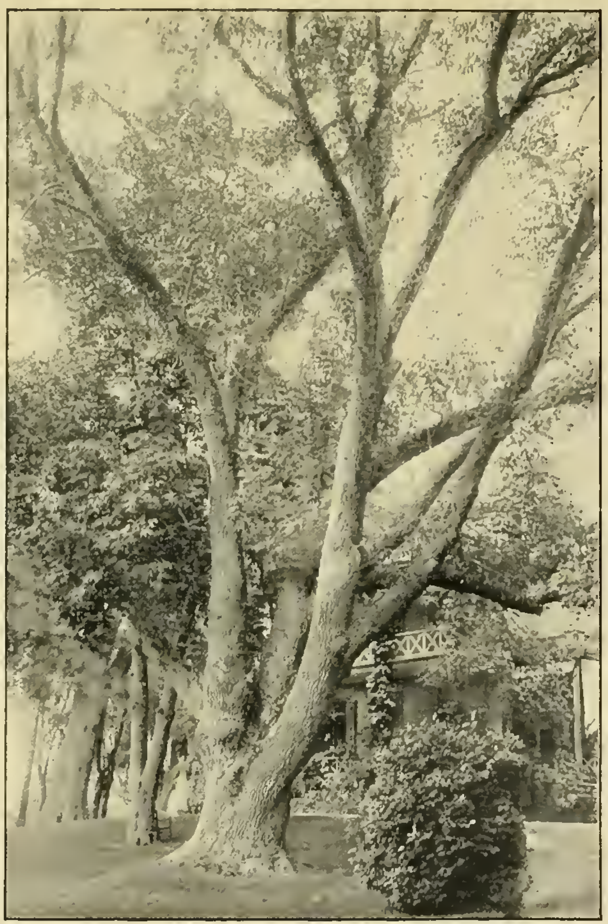
ASHANTI, à-shän'tē, or **ASHANTEE**. A negro kingdom in western Africa, separated from the Gulf of Guinea by the British Gold-Coast colony (q.v.), of which it has practically been a part since 1896 (Map: Africa, D 4). Its boundaries are only imperfectly defined, and its area is estimated at about 10,000 square miles. It is a fertile and well-watered region, and a large part of its surface is covered with tropical forests especially rich in resinous plants. The soil has been little cultivated, owing to the backward state of the country. The principal crops raised by the natives are yams, corn, rice, millet, and tobacco. The chief products for export are ivory, rubber, dyewoods, and gold. The latter metal is found in many parts of the country, but not in sufficient quantities to repay its mining by modern methods. The natives have several well-developed industries, and are skilled workers in metals and in the weaving of fabrics, as well as in the production of earthenware. The commerce of Ashanti was quite important before the Ashanti War of 1900, and amounted to about $7,000,000 annually. The railway line from Sekondi, on the coast, to Kumassi, the capital of Ashanti, recently constructed, will do much for the development of the country. Another railway line is proposed between Akkra and Kumassi, and the telegraph line was completed in 1900 as far as Mansu. The population of Ashanti is estimated at from 1,000,000 to 3,000,000. It consists of a great number of different tribes, who, prior to the British occupation, were governed by their own kings under the supremacy of the King of Kumassi. The principal tribes are the Bekwais, Kokofus, Kumassis, Daniassis, and Manpons, all of negro descent. Physically, the inhabitants of Ashanti are strong and well developed. Their speech belongs to the Tshi group. They practice polygamy, and their religion is a mixture of ancestor-worship and animism or nature-worship. Gold found in the country is wrought by the natives into barbaric ornaments. Capital, Kumassi (q.v.), with a population estimated at 30,000.

The beginnings of the Ashanti kingdom are obscure, but its traditions point to an immigration some hundreds of years ago from a region

ASH AND ARAUCARIA



ARAUCARIA EXCELSA, as a house plant.



ASH (Fraxinus americana).

to the north, probably caused by the spread of the Mohammedan Empire of Timbuktu. Our first positive glimpse of it is in the year 1700, when Kumassi was made the capital by Osai Too-too I., who conquered Akim, Assin, Gaman, Denkira, and other neighboring States. In their course of conquest over the Fantis, the Ashantis became involved in war with the British from 1807 to 1811, and from 1822 to 1831. In the second war the British met heavy reverses at first, but succeeded finally in driving the Ashantis from the seacoast and fixing the river Prah as the southern boundary of their kingdom. In 1873-74, in consequence of disputes arising in connection with the cession of the Dutch forts to Britain, war broke out again, and an army under Sir Garnet Wolseley forced its way to the centre of the kingdom. After a severe battle at Amoaful, and several days' fighting, Kumassi was taken February 4, 1874, and burned on the 6th; and though the rainy season had set in, the army returned in safety to the coast. The King submitted, promised to pay tribute, and to put an end to the slave traffic. In 1895, the King of Ashanti (Prempeh) having molested the English settlers on the coast, and raided the natives in numerous slave-hunting expeditions, a strong British force was sent again to Kumassi, which it reached with little resistance. The King was forced to submit to English authority and the kingdom became a British protectorate (January, 1896). In the spring of 1900 the Ashantis rose in sudden rebellion. The British Governor of the colony and some 200 troops were pent up in Kumassi by 15,000 Ashanti warriors. On June 3, Governor Hodgson, with a hundred men, succeeded in getting away to the coast, and on July 11 a relief expedition entered the town after a siege of nearly four months. Consult: H. C. J. Biss, *The Relief of Kumassi* (London, 1901); H. A. Freeman, *Travel and Life in Ashanti and Jaman* (London, 1898); C. C. Reindorf, *History of the Gold Coast and Ashanti* (Basel, 1895).

ASH'BURNER, Charles Albert (1854-89). An American geologist, born in Philadelphia, where he received his collegiate education. He became engaged in the geological survey of Pennsylvania, in the capacity of assistant, and afterwards was made head geologist, and carried on valuable investigations in connection with the survey of the coal-fields of Pennsylvania. He was a member of many scientific societies. His name is well known among geologists, both in this country and abroad, and is intimately associated with the history of coal stratigraphy. His writings include a large number of papers contributed to various scientific and technical journals.

ASH'BURTON, Baron. See Baring, Alexander.

ASHBURTON RIV'ER. A river of Western Australia, rising in the mountains west of the Great Sandy Desert, and flowing 400 miles northwestward into the Indian Ocean in latitude 22° S. (Map: Australia, B 3).

ASHBURTON TREA'TY. See Baring, Alexander; and Webster-Ashburton Treaty.

ASHBY-DE-LA-ZOUCH, ăsh′bĭ-de-lȧ-zo͞och′ (after the Norman family La Zouch). A small town of Leicestershire, England, about 17 miles northwest of Leicester (Map: England, E 4). Among the industries of the town are the manufacture of stockings, hats, and fire-brick. In the neighborhood are collieries and saline springs; ironstone, limestone, and fine clay are also found. the Church of Saint Helen is a rather handsome building; and the castle to the south of the town, now in ruins, known from Scott's *Ivanhoe*, was once the prison of Mary, Queen of Scots. Population, in 1891, 4500; in 1901, 4700. Consult E. Mammatt, *History and Description of Ashby-de-la-Zouch* (London, 1852).

ASH'BY, Turner (1824-62). A Confederate general. Early in 1861 he raised a regiment of cavalry, and by successive promotions attained the rank of brigadier-general in 1862. In May, 1861, he commanded at Point of Rocks, near Harper's Ferry, and in the spring of 1862 covered General Jackson's retreat before General Banks, earning the highest praise for his ability and gallantry. In June, 1862, he was killed in a skirmish at Harrisonburg, Va., two days before the battle of Cross Keys.

ASH'BY-STER'RY, Joseph. An English critic. He was born in London, and was educated as a painter, but soon turned to journalism. He has written some brilliant verses, sketches and novels, such as *Nutshell Novels* (1890); *Lazy Minstrel* (1892), which has run through many editions; *Naughty Girl: A Story of 1893* (1893); *A Tale of the Thames in Verse* (1896); and *The Bystander; or, Leaves for the Lazy* (1900). The last is a collection of his weekly papers in the *Graphic* under the title of "The Bystander."

ASH'DOD (Heb., stronghold). One of the five confederated Philistine cities, the modern village of Eshdud, three miles from the Mediterranean coast, between Gaza and Joppa. It had a commanding situation, and possessed a famous Dagon temple, in which the captured Yahweh ark was placed (I. Sam. v.). Sargon sent his general against this city in B.C. 711. Azuri had been superseded by his brother Ahimiti, and he had been overthrown by Yawani. Yawani was forced to flee to Muzri. Ahi-milki, King of Ashdod, is mentioned by Esarhaddon. According to Herodotus, the city was besieged twenty-nine years by Psammetichus. In the time of Nehemiah an Ashdodite dialect was spoken by the children in Jerusalem whose mothers were Philistines. Whether this was a Canaanitish or Aramaic dialect cannot be determined. Jonathan took the city in B.C. 147, and burned the Dagon temple. Pompey enfranchised the city. As Azotus, it became a centre of Greek civilization, and was also the seat of a Christian bishop.

ASHE, ăsh, John (1720-81). An American soldier. He was born in North Carolina; was a representative in the Colonial Assembly, and its presiding officer (1762-65), and was a member of the first Provincial Congress. Early in 1775 he recruited a force of 500, with which he took Fort Johnson, and in the following year he became brigadier-general of the North Carolina State troops. He was with General Lincoln in 1779, and while commanding an expedition sent to relieve Augusta, Ga., was surprised and defeated by General Prevost (March 3), at Brier Creek (q.v.). In 1781 he was made a prisoner at the capture of Wilmington (February 1), and after being treated with the utmost cruelty, died of smallpox, October 24. Asheville, N. C., was named in his honor.

ASH'ER (Heb., blessed). The name given by biblical tradition (Gen. xxxv. 26) to the eighth son of Jacob, being the second born to him by his concubine Zilpah, the handmaid of Leah. Asher is thus merely the customary eponymous heir of the tribe of Asher, which formed part of the confederation known as the B'ne Israel. The genealogy of Asher, indicating merely the subdivisions of the clan, is furnished (Gen. xlvi. 17, and Num. xxvi. 44; cf. I. Chron. vii. 30). But little is known of the clan, which plays scarcely any part in Hebrew history. Asher takes no part in the uprising against Sisera (Judges v. 17), while the statement (Judges vi. 35 and vii. 23) that Asher took part in the conflict with Midian is open to question. The position of the tribe is also difficult to ascertain, since but few of the places mentioned (Josh. xix. 24-31) as belonging to Asher have been identified. There are indications that the tribe was originally settled in southern Palestine, where it became mixed with non-Hebrew clans, and subsequently moved northward toward the seacoast, though neither Accho, Achzib, nor Sidon (mentioned Josh. xix. as cities of Asher) could ever have belonged to it. The popular etymology as 'happy' (Gen. xxx. 13) may furnish the real meaning, and it is also possible that Asher may have originally been the name of a deity. In that case it would be an etymological parallel to the Assyrian deity, Asher. A district or State of Asern in western Galilee is mentioned in Egyptian inscriptions of the time of Seti and Rameses II., but it is hardly likely that we have here anything more than a phonetic coincidence with Asher.

ASH'ERA. (1) A wooden post used in worship at the sanctuaries of Palestine in ancient times. It was employed not only by the Canaanites, but also by the Israelites at Samaria, Bethel, and Jerusalem (II. Kings xxiii. 6), in connection with the worship of Yahweh. It probably had phallic shape, represented a god or goddess of fertility, and stood at the boundary of a field and especially a sacred inclosure. In Assyrian, *Ashirtu* also has the meaning of 'sacred precincts,' and this is its manifest sense in the Phœnician Masud inscription. There was a strong prophetic opposition to this cultus-object, and many *asheras* were hewed down by Josiah after B.C. 621. (2) Ashera was also the name of a goddess. With the conquest of Syria the worship of Amurru and his consort, Ashratu, found its way into Babylonia in the time of Hammurabi. An Abdashirta, 'servant of Ashera,' flourished in Syria in the days of Amenhotep III. (B.C. 1439-03). Katabanian inscriptions show that this goddess was worshiped in South Arabia. Athirat is the consort of Wadd, the god of love. It is natural to infer that there was some connection between the goddess Ashera and the sacred pole.

ASH'ES. The substance of all plants and animals contains as an indispensable ingredient a certain amount of mineral matter which remains behind as ash when the organic portion of the substance is burned. The covering of the head with ashes has long been accepted as a sign of mourning among Eastern nations, and instances of this are found in Scripture. Penitents in the early Christian Church signified their sorrow and humiliation in a similar manner, by standing at the door of a church in 'sackcloth and ashes.'

According to Warington, the proportion of ash varies from 0.2 to 0.4 per cent. in the dry matter of the wood of trees, from 2 to 5 per cent. in seeds, from 4 to 7 per cent. in the straw of cereals, from 4 to 8 per cent. in roots and tubers, from 5 to 9 per cent. in hay, and from 10 to 25 per cent. in leaves of root crops.

USES. The ashes of sea-plants are a common source of bromine and iodine, and the ashes of animal bodies form a source of phosphorus. But the commercial value of ashes depends mainly on their use: (1) as a source of alkali (pearl-ash, potashes, etc.), and (2) as a fertilizer. The fertilizing value of ashes is due to the fact that they contain all of the mineral constituents required by plants, especially potash, and that largely in one of the most desirable forms—viz., as potassium carbonate. The following three classes of ashes are the most important for agricultural purposes: (1) Wood ashes from household fires, furnaces, etc.; (2) cotton-hull ashes, resulting from the uses of cotton hulls as fuel under boilers, etc., in the cotton-growing regions; and (3) lime-kiln ashes, which are a mixture of more or less lime with the ashes of the fuel used in the kilns.

WOOD ASHES. Wood ashes were formerly the almost exclusive source of potash for fertilizing purposes. They have, however, been very largely replaced by the German potash salts. At the present time the supply of wood ashes is limited on account of the general substitution of coal for wood as fuel. Canada is the main commercial source of supply in America. The ashes are collected from house to house and stored in structures built for their reception (asheries). When first collected they are said to weigh from 34 to 40 pounds per bushel; but when stored they undergo a heating and sweating process which disintegrates the particles of charcoal and causes the ashes to shrink about one-fifth in bulk, the weight per bushel increasing from 40 to 48 pounds. Dealers estimate that it requires about 30 cords of hardwood to make one ton of ashes.

The composition of wood ashes varies with the kind of wood, the intensity of the fire, the proportion of impurities and unburned material (charcoal), and the care in storage. The hard woods yield ashes richer in potash than those of the soft woods. In intense fires, some potash is lost by volatilization. Pure ashes carefully prepared from hard woods have been found to contain more than 17 per cent. of potash; those from soft woods almost 10 per cent., besides about 2 per cent. of phosphoric acid. No such ashes are found on the market. In several hundred analyses of samples of commercial, unleached ashes, there was found, on an average, about 5 per cent. of potash, 1.5 per cent. of phosphoric acid, and 30-35 per cent. of lime. This inferiority of the commercial product may result from unavoidable causes, or it may be partly due to adulteration with leached ashes, coal ashes, soil, etc. In any case, the great variability of the product emphasizes the importance of purchasing ashes only on a guaranty of composition. Although the value of ashes as a fertilizer depends primarily upon the potash they contain, and although they may be expected to give the best results on soils and crops especially demanding potash, still their fertilizing action is not entirely due to the potash. The small amount of phosphoric acid which they contain is not without fertilizing value, and the lime, which is present to the extent of 600 to 700 pounds per ton (of 2000 pounds), is of great value in improving the texture and in correcting the acidity of soils, besides supplying an element which is deficient in many soils.

Ashes which have been subjected to leaching show a reduced percentage of potash and an increased percentage of moisture. The average composition of such ashes, as shown by a large number of analyses, is as follows: Moisture, 30 per cent.; potash, 1.3 per cent.; phosphoric acid, 1.5 per cent.; lime, 28 per cent. The fertilizing action of leached ashes is due very largely to their favorable physical effects on the soil, which are brought about mainly by the lime present.

Cotton-Hull Ashes. Cotton-hull ashes are much richer in fertilizing constituents than wood ashes and are highly esteemed, especially in New England, as a fertilizer for tobacco. They contain on an average about 23 per cent. of potash, 9 per cent. of phosphoric acid, and 8.8 per cent. of lime, although their quality varies greatly. The great demand for these ashes by tobacco growers, with the limited supply, has caused the price of the potash they contain to rise much higher than that of potash in other standard fertilizing materials. The high percentage of phosphoric acid which these ashes contain, however, makes them a valuable source of this fertilizing constituent. The percentage of lime is too small to exert any marked influence on the fertilizing effect. The potash has been found to vary from 10 to 42 per cent., the phosphoric acid from 3 to 13 per cent. This great variability may be due to adulteration or to the use of other fuel with the hulls.

Lime-Kiln Ashes. These are obtained in the burning of lime with wood and usually contain less than 1.5 per cent. of potash, about 1 per cent. of phosphoric acid, and 45 to 50 per cent. of lime. The low percentage of potash and phosphoric acid, and high percentage of lime, are due to admixture of lime from the kiln. Such ashes are valuable mainly for their lime.

Other Kinds of Ashes. Among other kinds of ashes which occasionally attain some agricultural importance are tan-bark ashes, which, according to Voorhees, seldom contain more than 2 per cent. of potash, 1.5 per cent. of phosphoric acid, and 33 per cent. of lime; coal ashes, which contain only traces of phosphoric acid and soluble potash and are useful only for improving the physical condition of heavy soils; and seaweed ashes, which are very variable in composition on account of imperfect incineration or admixture of impurities, but are generally very poor in fertilizing constituents.

ASHEVILLE, ăsh′vĭl. A city and county-seat of Buncombe County, N. C., 262 miles by rail northeast of Atlanta, Ga.; at the junction of the Swannanoa and the French Broad rivers, and on the Southern Railway (Map: North Carolina, B 4). It is finely situated, at an elevation of 2300 feet in a mountainous region, and is widely celebrated as a health resort, both summer and winter. The city contains a public library, Asheville Normal and Collegiate Institute, Bingham Military School, Asheville School for Boys, Asheville College for Young Women, Asheville Academy of Fine Arts, and other educational institutions. The post-office and United States Government building, county court-house, city hall, auditorium, and Battery Park Hotel are notable buildings, and additional points of interest are Overlook Park, Richmond Hill, Beaumont (grounds), Conally's View, and Swannanoa Drive along the river bank. Adjoining the city is the great Vanderbilt estate, Biltmore. Asheville is in a region which has some mineral wealth and valuable timber, and is especially adapted to stock-raising, dairying, and general agriculture, as well as truck-gardening and fruit-growing; it has become an important tobacco market and manufactures wagons, cars, agricultural implements, cotton goods, tanned leather, and tobacco. Settled in 1792, Asheville was first incorporated about 1835. The government, under a revised charter of 1901, is vested in a mayor, biennially elected; a city council, chosen on a general ticket, and subordinate officials, the majority of whom are either elected by the council or confirmed by that body upon nomination of the executive. The waterworks are owned and operated by the municipality. Population, in 1890, 10,235; in 1900, 14,694.

ASH FLY. A gall-fly of the oak (*Cynic quercifolii*). See Gall-Insects.

ASH′FORD. A market town of Kent, England, situated on the Stour, about 54 miles southeast of London (Map: England, G 5). It is well built and lighted, and has an excellent water supply. The town maintains public baths, a park, hospital, and technical schools. It has manufactures of linen goods and pianos, and a large workshop of the Southeastern Railway. Population, 1891, 10,700; in 1901, 12,800. Ashford was the home of Jack Cade (q.v.).

ASH′HURST, John (1839-1900). An American surgeon. He was born at Philadelphia, graduated in 1857 at the University of Pennsylvania; studied medicine, and from 1862 to 1865 was assistant-surgeon in the United States Army. He was appointed professor of clinical surgery in the University of Pennsylvania in 1877, Barton professor of surgery in 1883, and president of the Philadelphia College of Physicians in 1898. He was a member of several scientific societies, and edited Erichsen's *Science and Art of Surgery* (1869) and the *International Encyclopædia of Surgery*, 2 vols. (1881-86). His original publications include *Injuries of the Spine* (1867) and *Principles and Practice of Surgery* (1871).

ASHI, ăsh′ĭ, Rabbi (352-427 A.D.). A son of Simai and member of a well-known family. Nothing is known of his childhood life or education, but at an early age he became the head of the Rabbinical school at Sura or Sora in Babylonia. He is said to have rebuilt the schoolhouse at that place, and such was the distinction which he gained among his contemporaries that he was accorded the honorable title 'Rabbana,' i.e. 'our teacher.' His chief claim to fame rests upon the attempt that he made to gather the discussions of the Rabbis on the Mishnah into a compilation known as the 'Gemara,' which, together with the Mishnah, represents the Talmud. He worked at this task for more than fifty years, but it was left for his successors to complete it. See Talmud.

ASHIKAGA, ä'shē-kä'gä. A town of Japan in the prefecture of Tochigi, situated in the southern part of Honshiu, 71 miles by the Riomo Railway, from Tokio (Map: Japan, F 5). The town was famous for its academy of Chinese learning said to have been founded in the Ninth Century. It contained an extensive library of Chinese works and was one of the most famous centres of Chinese culture and Confucianism. With the establishment of the Seido at Yolo, at the end of the Seventeenth Century, it lost its former importance, and at present retains only a fraction of its library and an image of Confucius. Commercially Ashikaga is important for its extensive trade in cotton and silk goods. Population, in 1898, 21,348.

ASHIKAGA. A dynasty of Shoguns or military lieutenants of the Mikado, who ruled Japan from 1336 to 1574, the last being overthrown by Ota Nobunaga. See Shogun.

ASHIO, ä-shē'ō. A town of Japan, situated in the southern part of Honshiu, 10½ miles southwest of Nikko. It is famous for the two copper mines of Ashio and Kotaki, 2 miles distant, considered the most productive in Japan. In the vicinity of the town are situated extensive smelting-works, run by electricity generated by water-power. Population, about 6000.

ASH'KELON (Gk. 'Ασκάλων, *Askalōn*, Heb. *Ashkelon*), or Ascalon. A ruined city of Palestine, situated on the shore of the Mediterranean, 36 miles west-southwest of Jerusalem. It was in ancient times a fortified city. After passing from the possession of the Egyptians to the Canaanites it became one of the five towns of the Philistine Confederacy. Its name occurs in the history of the people of Israel in the Old Testament, where it is represented as falling at an early period into the hands of the tribe of Judah, but it never submitted to the Israelite domination and remained a bitter enemy of the Jewish monarchy to the last. Ashkelon was the seat of worship of Astarte and of the fish deities, Dagon and Dercetis, whose temple, according to Herodotus, was plundered by the Scythians in B.C. 630. Herod the Great embellished it with baths, palaces, and fountains; but in the subsequent wars with the Romans, it suffered much damage. After continuing long under the dominion of the Roman Empire, the city came into the possession of the Saracens in the Seventh Century. On August 12, 1099, a great victory was won by Godfrey de Bouillon over the army of the ruler of Egypt on the plains of Ashkelon. The city was taken and retaken during the wars of the Crusaders, and was finally destroyed by the Sultan Bibars in 1270. The ruins of the massive city walls still stand, and not far from the ancient site of the city is a small village of Arabs and Christians.

ASH'KENA'ZIM. Ashkenaz is a name found in the genealogical list of Genesis (x. 3), where he is entered as the son of Gomer. The reference is probably to an Armenian people, but by the Jews themselves Ashkenaz was made to refer to Germany; and the Jews of Germany (as well as of other regions in which German Jews have settled) are called Ashkenazim, as against the Sephardim—the so-called Portuguese Jews, the descendants of the Jews of Spain and Portugal. The difference between the two consists merely in a different pronunciation of the Hebrew, and slight divergences in the ritual. Doctrinally, there is no difference. At times, however, social distinctions have been very great and intermarriage almost impossible.

ASH'LAND. A city in Boyd County, Ky., 144 miles east by south of Cincinnati, Ohio, on the Ohio River, and on the Chesapeake and Ohio, the Norfolk and Western, and other railroads (Map: Kentucky, J 2). The principal features of interest are Central Park, a public preserve of about fifty acres in the centre of the city, and Cliffside Park, a summer resort with various attractions, maintained by a corporation, just outside the city limits. Ashland is important chiefly as a manufacturing city, though it carries on also an extensive trade in coal, iron ore, and the varied products of its industrial plants, which include pig iron, cut and wire nails, wire rods, steel billets, sheet steel, fire brick, leather, furniture stock, and oak and poplar lumber. Settled in 1854, Ashland was chartered as a city in 1870. Under a revised charter of 1894, the government is vested in a mayor, elected every four years, and a city council which chooses all municipal officials excepting the board of education. Population, 1890, 4195; 1900, 6800.

ASHLAND. A village and county-seat of Ashland County, Ohio, 65 miles southwest of Cleveland, on the Erie and other railroads (Map: Ohio, F 4). It has a public school library, miscellaneous manufactures, and a trade in grain. Population, 1890, 3566; 1900, 4087.

ASHLAND. A city in Jackson County, Ore., 15 miles southeast of Jacksonville, the county seat; on Ashland Creek and on the Southern Pacific Railroad (Map: Oregon, C 7). One of the most important towns in southern Oregon, it has fruit-growing, gold-mining, and granite and sandstone quarrying interests, and contains railroad shops, flour-mills, planing-mills, quartz mills, creamery, lumber-yards, etc. The city is the seat of a State normal school, and, from the existence of mineral springs with medicinal properties, is developing as a health resort. There are municipal water-works. Population, 1890, 1784; 1900, 2634.

ASHLAND. A borough of Schuylkill County, Pa., 12 miles northwest of Pottsville, on the Philadelphia and Reading, and Lehigh Valley railroads (Map: Pennsylvania, E 3). Coal mining is the chief industry, but there are also important foundries, machine-shops, etc. Ashland owns and operates its water-works. Settled in 1850, Ashland was incorporated in 1857. Its charter of that date provides for a mayor elected every three years and a city council of fifteen members. Population, in 1890, 7346; in 1900, 6438.

ASHLAND. A residential town in Hanover County, Va., 17 miles north of Richmond, on the Richmond, Fredericksburg, and Potomac Railroad (Map: Virginia, G 4). It is the seat of Randolph-Macon College (Methodist Episcopal, South), founded in 1832, in Mecklenburg County, and removed to Ashland in 1866. Settled in 1845, Ashland was incorporated in 1856. Under the charter, last revised in 1899, it is governed by a mayor, elected for two years, and a town council. Ashland suffered from a number of raids during the Civil War, and the locality was the scene of several battles. Henry Clay was born about seven miles from Ashland. Population, in 1890, 948; in 1900, 1147.

ASHLAND. A city and county-seat of Ashland County, Wis., 185 miles northeast of Saint Paul, Minn., on Chequamegon Bay, one of the finest harbors on Lake Superior (Map: Wisconsin, C 2). Steamers connect it with lake ports, and it is on the Wisconsin Central, the Chicago, Saint Paul, Minneapolis and Omaha, the Northern Pacific, and the Chicago and Northwestern railroads. The city contains, among other notable features, the Vaughn Public Library, North Wisconsin Academy, an opera house, a fine United States Government building and post-office, and Knight Hotel. The Apostle Islands, in Chequamegon Bay, are of historic and scenic interest. Industrial and commercial interests are represented by several lumber-mills, charcoal blast-furnaces, steel-plant, foundries and machine-shops (including railroad shops of the Chicago and Northwestern), pulp-works, brown-stone quarries, large wholesale houses, and extensive ore and merchandise docks. Ashland is one of the most important ports on the Great Lakes, the point from which the product of the iron mines of the Gogebic Range is shipped. Lumber, brown-stone, and the principal manufactured products also constitute extensive shipments. The government, under a charter of 1889, is vested in a mayor, elected every two years; a municipal council, and administrative officials whose appointment by the mayor is subject in certain cases to the consent of the council. Settled in 1854, Ashland was incorporated in 1863, and since 1876 has made rapid growth. It was chartered as a city in 1887. Population, in 1890, 9956; 1900, 13,074.

ASH′LAR. See Masonry.

ASH′-LEAVED′ MA′PLE. See Box Elder.

ASH′LEY, Anthony Evelyn Melbourne (1836—). An English statesman of the Liberal Party, fourth son of the seventh Earl of Shaftesbury. After his graduation at Trinity College, Cambridge, he was called to the bar at Lincoln's Inn, and joined the Oxford Circuit. He was private secretary to Lord Palmerston from 1858 to 1865, barrister of the Oxford Circuit from 1865 to 1874, and parliamentary secretary to the Board of Trade from 1880 to 1882. Mr. Gladstone selected him (in 1882) to succeed Mr. Courtney as under secretary of state for the colonies. He was also member of Parliament from 1874 to 1885, when he was defeated in the Isle of Wight contest. In 1891 he was made a privy councillor. He is the author of *The Life of Henry John Temple, Viscount Palmerston.*

ASHLEY, William James (1860—). An Anglo-American educator. He was born in London, England, graduated at Balliol College, Oxford, in 1881, was fellow of Lincoln College, and lecturer in history at Lincoln and Corpus Christi in 1885-88, and professor of constitutional history and political economy at the University of Toronto in 1888-92. In 1892 he was appointed professor of economic history at Harvard University. His publications include *James and Philip van Artevelde* (1883); *An Introduction to English Economic History and Theory* (1888-93); and *Surveys, Historic and Economic* (1900). He has also translated for the "Economic Classics" series, of which he was editor, Schmoller's *Mercantile System* (1896) and Turgot's *Reflections* (1898).

ASH′LEY COOP′ER. See Shaftesbury, Earls of.

ASH′MEAD-BART′LETT, Sir Ellis (1849-1902). An English statesman. He was born in Brooklyn, N. Y., the eldest son of Ellis Bartlett, a minister of Plymouth, Mass., and of Sophia, daughter of J. K. Ashmead, of Philadelphia. He received his education at Torquay and at Christ Church, Oxford, where he was president of the Oxford Union. He graduated with high honors and was called to the bar at the Inner Temple in 1877. He was member of Parliament from 1880 to 1885, in 1886, 1892, and 1895, and Civil Lord of the Admiralty from 1885 to 1886, and from 1886 to 1892. He served in South Africa in 1900, and in the Græco-Turkish War of 1897, when he was taken prisoner by a Greek warship, the commander of which mistook him for a spy. He was knighted in 1892. He was a frequent speaker in the House, especially on foreign questions, and published *The Battlefields of Thessaly* (1897).

ASH′MOLE, Elias (1617-92). An English antiquary, founder of the Ashmolean Museum, at Oxford University. He was born at Lichfield and became a lawyer. In the Civil War he favored the royalist side and held a commission in the army. About this time he became interested in the study of astrology and alchemy, and entered Brasenose College, Oxford, to study these subjects, together with physics and mathematics. He was one of the earliest of English Freemasons, having been initiated about 1646. With the Restoration, Ashmole received many court offices and honors. His later interests were almost entirely in antiquarian subjects. He received by bequest the collection of curiosities of John Tradescant, and with his own additions it was turned over to Oxford University in 1682. He was the author of *Theatrum Chemicum* (1652), a collection of ancient metrical treatises on alchemy; *Institution, Laws, and Ceremonies of the Order of the Garter* (1672); *The Antiquities of Berkshire* (3 vols., 1719), and his *Diary* (1717).

ASH′MOLE′AN MUSE′UM. A museum of antiquities at Oxford, founded by Elias Ashmole, and contained in a building erected by Christopher Wren in 1682. In the floor are some of the Arundel Marbles. See Oxford University.

ASH′MUN, George (1804-70). An American lawyer and politician, born in Blandford, Mass. He was admitted to the bar in 1828, served for four terms in the Lower House of the Massachusetts Legislature, and for one term in the State Senate, and was an influential member of Congress from 1845 to 1851. In 1860 he presided over the convention at Chicago, which nominated Lincoln for President.

ASHMUN, Jehudi (1794-1828). An American missionary. He was born at Champlain, N. Y., graduated at the University of Vermont in 1816, and was elected a professor in Bangor Theological Seminary (Congregational). He soon resigned, joined the Episcopal Church, and became editor at Washington of *The Theological Repertory*. In this periodical he advocated the views of the African Colonization Society for founding a colony of liberated negroes on the west coast of Africa. Soon he was appointed an agent of the Society, and in 1822 conducted a body of liberated negroes from Baltimore to

Liberia. He devoted the next six years to the task of putting the colony on a solid basis, but was obliged to return to the United States and soon died. See his *Life*, by R. R. Gurley (1839).

ASHRAF, á-shräf′. A town of Persia in the Province of Mazanderan, situated near the coast of the Caspian (Map: Persia, E 3). It was the favorite residence of Shah Abbas the Great, and the ruins of the palaces and gardens bear evidence of their former splendor. The proximity to the Caspian coast gives the town some commercial importance. Ashraf carries on a considerable trade with Russia in cotton and silk goods. In its flourishing days it is supposed to have contained as many as 2000 families which have dwindled to about 800.

ASH′TABU′LA. A city in Ashtabula County, Ohio, on a river of the same name, 3 miles from Lake Erie, and 54 miles east by north of Cleveland, on the Lake Shore and Michigan Southern, the New York, Chicago, and St. Louis, and the Pittsburg, Youngstown, and Ashtabula railroads (Map: Ohio, J 2). It contains a public library, founded in 1895. The city has shaft factories, tanneries, woolen mills, and manufactures of farm implements, etc.; and does a large business in the shipment of coal and trans-shipment of iron ore, through the fine harbor at the river's mouth. Ashtabula was first settled in 1803, and in 1805 was organized as a township, including within its limits what are now Kingsville and Plymouth, separately incorporated, in 1810 and 1838, respectively. Population, in 1890, 8338; in 1900, 12,949.

ASH′TAROTH. See Astarte.

ASHTAROTH KAR′NAIM. A city mentioned in Gen. xiv. 5. The name should probably be read Ashtarath Karnaim, and means 'Ashtarath of the two-peaked [mountain].' It is possibly the modern Tell-Ashtarah, on the Bashan Plateau, 21 miles east of the Lake of Galilee, though places named after the great goddess must have been quite numerous. Consult Moore, in *Journal of Biblical Literature*, vol. xvi., p. 155 ff.

ASHTAR′TE. See Astarte.

ASH′TON, John (1834—). An English literary antiquarian. Among his numerous valuable publications are *Social Life in the Reign of Queen Anne* (1882); *History of the Chapbooks of the Eighteenth Century* (1882); *English Caricature and Satire on Napoleon I.* (1884); *A Century of Ballads* (1887); *Modern Street Ballads* (1888); *Social England Under the Regency* (1890); *Real Sailor Songs* (1891); *The Devil in Britain and America* (1896); *When William IV. Was King* (1896); *Gambling in England* (1898); *Florizel's Folly*, the story of George IV. and Mrs. Fitzherbert (1899).

ASHTON, Lucy. The daughter of Lord and Lady Ashton, in Scott's *Bride of Lammermoor*, and the heroine of the novel. Forbidden by her parents to marry her lover, Ravenswood, she goes mad on her wedding night and dies.

ASH′TON-IN-MAKERFIELD, -măk′ẽr-fēld. A town in Lancashire, England, about 15 miles west of Manchester. Its chief industries are the manufacture of cotton and pottery. There are also numerous collieries. Population, in 1891, 13,400; in 1901, 18,700.

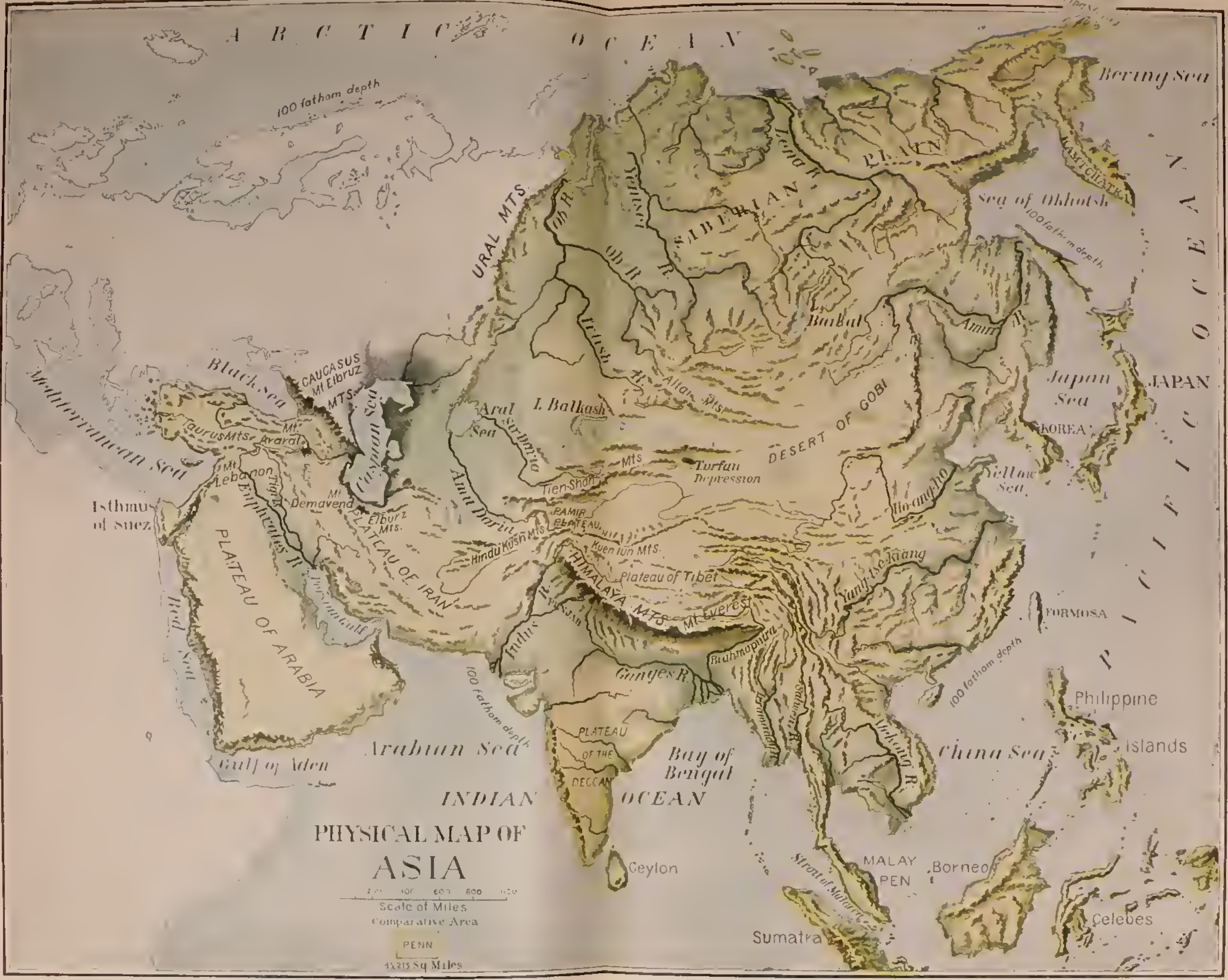
ASH′TON-UN′DER-LYNE. A busy manufacturing town of Lancashire, England, on the Tame, about 6 miles east of Manchester. It is a Parliamentary borough, returning one member to Parliament (Map: England, D 3). The town is of Saxon origin, and came into the possession of the Assheton family in 1336. Its change from comparative insignificance to an important manufacturing centre dates from the introduction of the cotton industry in 1769, which is its leading industry to-day; bleaching, dyeing, and calico-printing, coal-mining, and the manufacture of machines, bricks, etc., furnish also considerable employment to the people. Its facilities for communication are excellent, as it is situated on four railway lines, and connected by a canal with Manchester and other important towns. Population, in 1891, 40,500; in 1901, 43,900.

ASH′TORETH. See Astarte.

ASHUAPMOUCHOUAN. See Chamouchouan.

ASH-WEDNESDAY, wĕnz′dā. The first day of Lent (q.v.), so called from the Roman Catholic ceremony of strewing ashes on the head as a sign of penitence. This custom was sanctioned by Pope Celestin III. in 1191, and afterwards generally prevailed. The present custom in the Church of Rome on this day is this: After an introit and four collects, the priest puts the ashes, which are those made by burning the palms consecrated on the preceding Palm Sunday, on the head of each penitent kneeling at the altar rails, while he says in Latin: "Remember, man, that thou art dust and shalt return to dust." The Protestant Church in Germany does not celebrate Ash-Wednesday. In the Church of England and in the Protestant Episcopal Church in the United States, it is observed, but without anything of the ceremony from which it derives its name; and the *commination*—a series of denunciations against impenitent offenders, along with penitential prayers, is appointed to be read in the service for this day in the English Church; but in the American Church only the penitential prayers.

ASIA, ā′shĭ-à. The largest division of land on the globe, and the east portion of the Eurasian continent, of which it embraces more than four-fifths. Its area, exclusive of islands, is about 16,000,000 square miles; or, including islands, is about 17,000,000 square miles, equal to about one-third of the land area of the globe, and its population is estimated at upward of 850,000,000. This enormous continental mass, with the exception of a territory in the extreme northeast, about as large as the area of England, lies in the northern division of the Eastern Hemisphere, while the islands commonly associated with it extend on the southeast across the Equator. On three sides it is surrounded by the ocean, but on the west it joins Europe, the line of separation between them being commonly accepted as the Ural Mountains, an irregular line from their south end to the north end of the Caspian Sea, and thence the Caucasus Range to the Black Sea. The whole length of the continent, measured along a parallel of latitude, from the Dardanelles to the Japan Islands, from longitude 26° E. to longitude 130° E., is 5500 miles; its breadth from its southernmost point, the extremity of Malacca to Cape Tchelyuskin, in Siberia, its northernmost point, from latitude 1° 15′ N. to



PHYSICAL MAP OF
ASIA

Lowlands, below 1,000 Feet elevation, are shown in Green. Highlands, above 1,000 Feet elevation, are shown in Buff.

latitude 77° 37′ N. is 5100 miles, although with its islands it extends to latitude 10° S. By means of the Isthmus of Suez, Asia has a slight connection with Africa, from which it is separated by the narrow Red Sea, occupying a rift valley of comparatively recent formation. The continent has an average elevation above the sea of over 3000 feet. The coast-line is about 33,000 miles in length, and on the south and east is greatly diversified by seas, bays, and gulfs, affording advantages to navigation and commerce far superior to those of Africa and South America, but inferior to those possessed by Europe and North America. The indented and broken northern coast is not available for navigation, because of being ice-bound throughout the greater part of the year.

Asia is bounded northward by the Arctic Ocean, eastward by the Pacific Ocean, southward by the Indian Ocean, and westward by Europe, the Caspian Sea, the Black Sea, the Mediterranean, and the Red Sea. On the extreme northeast, it is separated from North America only by the narrow Bering Strait, about 40 miles wide. On the southeast, the vast eastern archipelago, comprising numerous great islands, Luzon and Mindanao in the Philippines, Sumatra, Borneo, Java, Celebes, New Guinea, and hundreds of smaller ones, extends toward Australia. The body of the continent may be regarded as a trapezium, of which the projections, consisting of several large peninsulas, bear some resemblance to those of Europe, though in Asia everything is on a greater scale. On the west is the peninsula of Asia Minor, or Anatolia, separated from Europe by the Bosporus, the Sea of Marmora, and the Dardanelles, with the Black Sea on the north, the Ægean Sea on the west, and the Levant (the easternmost part of the Mediterranean) on the south. On the south of Asia, Arabia may be considered as a counterpart of the Iberian Peninsula; Italy, with its neighboring island, Sicily, is represented by India and Ceylon; and as the broken Grecian Peninsula in Europe has numerous islands extending toward Asia on the southeast, so in Asia, the Malay Peninsula has an island connection with Australia on the southwest by means of the eastern archipelago. The eastern coast of Asia is characterized by the deep indentations made by the Pacific Ocean, forming the China Sea on the southeast, and the Yellow, Japan, Okhotsk, and Bering Seas on the east, all island-bound, and the last four separated respectively by the Peninsula of Korea, the island of Saghalin, and the Peninsula of Kamchatka. On the north the Siberian coasts are also deeply indented, but rather by the embouchures of large rivers than by arms of the sea.

Topography. The relief features of this continent are characterized by great extremes and by an unparalleled variety; it has the most extensive lowlands, the greatest table-lands, the highest chains of mountains, and the most elevated summits in the world. Tracts doomed to everlasting snow and scorching sterility, salubrious valleys of continual verdure, and noisome jungles of the rankest growth are found within its limits.

About 1000 miles southwest of the centre of the continent, where India, Turkestan, and Afghanistan meet, is an elevated region known as the Pamirs, and to its inhabitants as the 'roof of the world.' It is of great height, even the valleys exceeding 11,000 feet in altitude above the sea, while the mountains are many thousand feet higher. From this region as a centre, mountain systems and ranges radiate in various directions, but mainly eastward and westward, inclosing between them elevated plateau-like areas. These mountain systems with the inclosed plateaus, form the broad backbone of Asia, running with a widely differing breadth, nearly east and west across the continent. It is widest in the east, where it stretches from the Indo-Chinese Peninsula across Western China and Manchuria to Southeastern Siberia, extending from latitude 20° to 50° N.; it narrows in the Pamirs, and broadens again westward to include most of Afghanistan, Baluchistan, Persia, and Asia Minor. From the mountain knot of the Pamirs stretches a mountain system, bordering the northern margin of the main plateau. The ranges comprising the system are somewhat broken and disconnected, and many of them arranged *en échelon.* They extend, under various names, to the coast of the Sea of Okhotsk, and thence along the coast to Bering Strait. North of them lies Siberia, a great plain with a breadth of 130° of longitude, sloping gently over 25° of latitude to the Arctic Ocean.

East of the Pamirs the great plateau is limited on the south by the Himalayas, while between this great range and the northern system are many other ranges traversing it. This table-land contains the plateau of Tibet and the vast elevated expanse of Han-hai, which includes the Desert of Gobi or Shamo, and the Takla Makan Desert. The plateau of Tibet lies directly north of the Himalayas, and is limited on the north by the Karakarum, Kuenlun, Altyn Tagh, and Nanshan ranges, and on the east by the broken mountainous country in the west of China. Its surface is a plain, diversified by many mountain ranges, trending generally east and west. It is the most elevated plateau on earth, its western part ranging in height from 14,000 to 17,000 feet, sloping eastward down to 9000 feet. It is a bleak, arid region, and its few inhabitants are occupied mainly in pastoral pursuits. The great plateau of Han-hai, which lies north and northeast of Tibet, is limited on the north by the succession of ranges which commence with the Tian-shan, and are followed by the Alatau, Altai, Tannu, Sayanskii, Yablonoi, and Stanovoi ranges, and extend northeastward to the Sea of Okhotsk and Bering Strait; and on the east by the Khingan Mountains, mainly comprised in Mongolia. Its otherwise level surface is intersected by many mountain groups, and has an elevation of 3000 to 4000 feet.

On the south the plateau region is separated from the plains of Hindustan by the Himalaya Mountains, many of whose summits rise from 25,000 to 29,000 feet above the level of the sea. Even the passes over this enormous range are almost as high as the summit of Mont Blanc. Here Dhwalagiri, long supposed to be the Mont Blanc of the Himalayas, rises to 26,800 feet, leaving all the peaks of the Andes far below, while Kunchinjinga reaches beyond 28,000 feet, and Mount Everest, now believed to be the loftiest summit on earth, attains the height of 29,000 feet.

From the Pamirs stretches westward a great succession of mountain ranges, which, beginning with the Hindu Kush (which attains a height of 25,000 feet), and prolonged westward by the

Paropamisus, in Afghanistan, by the Elburz in northern Persia, with Demavend (about 18,500 feet), by the mountains of Armenia (culminating in Mount Ararat), and by the Taurus Range and other mountains of Asia Minor, forms a fairly continuous line of ranges to the shore of the Ægean Sea. North of it, in southwestern Siberia and western Turkestan, is a depressed area, in some places below sea-level, which is drained into the Aral and Caspian seas. The great plateau of which these ranges form the back-bone consists of three sections. To the south of the Elburz Range and the Paropamisus, is the great plateau of Iran, in Persia, Afghanistan, and Baluchistan. West of this is the Median-Armenian Alpine region, some of whose plateaus are at elevations of over 6000 feet. Beyond this the plateau formation extends westward in the Anatolian table-land. The western plateau of Asia, thus divided into three sections, is full of diversities of soil and scenery. A great part of the table-land of Iran is extremely barren and arid, which serves to explain the enthusiastic terms in which the Persian poets have spoken of the beautiful valleys found here and there among the mountains. The coasts of the Persian Gulf are sandy wastes. A great part of Baluchistan also is an arid plain, covered with red sand.

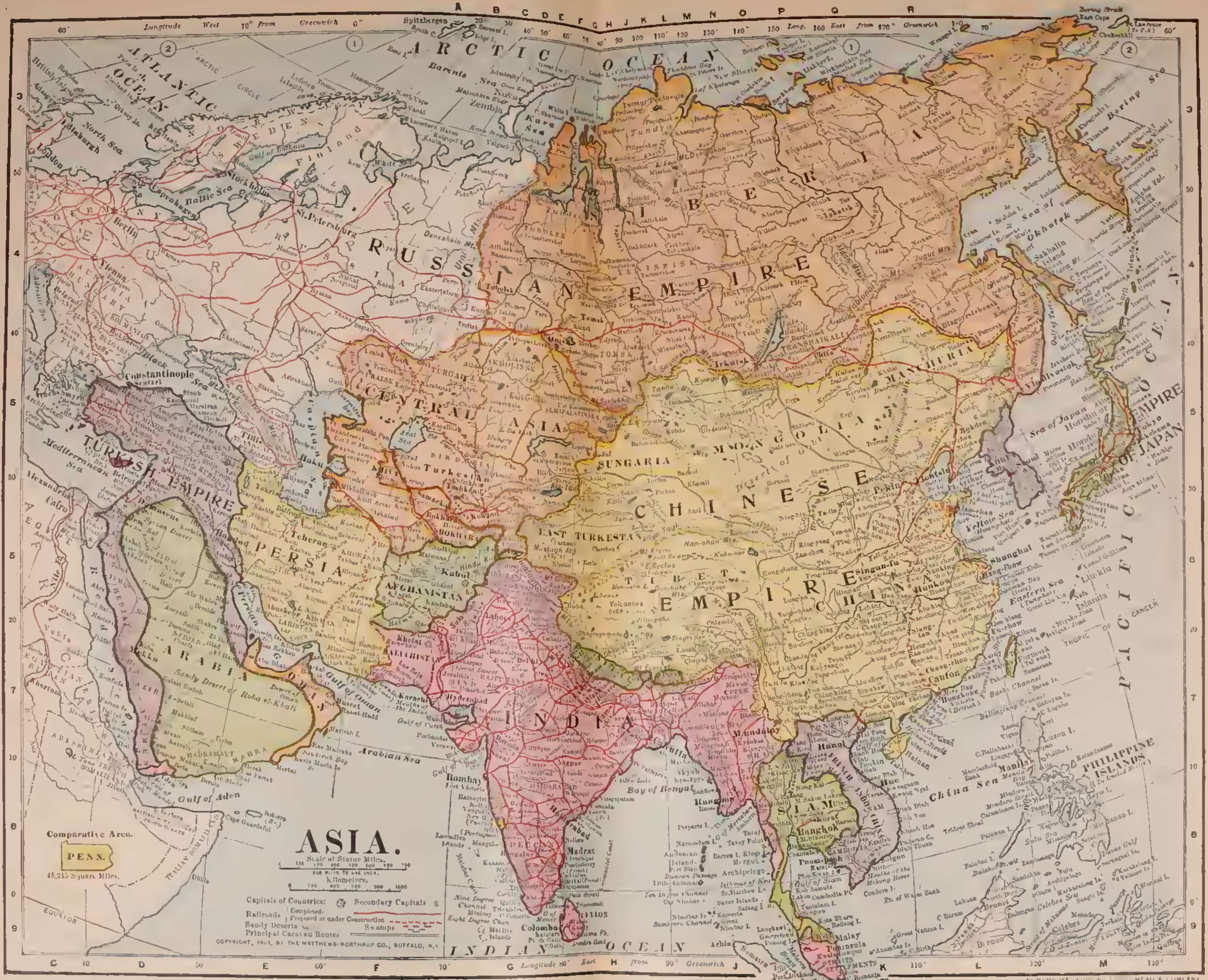
Besides these central elevated land masses, there are many detached mountain chains and plateaus. The Ural Mountains, forming in part the land boundary between Europe and Asia, are divided into three sections—the northern, central, and southern Ural. The second of these divisions is rich in minerals, gold, platinum, magnetic iron, and copper. On the isthmus between the Black Sea and the Caspian, the Alpine ridges of the Caucasus reach a height of 10,000 to 11,000 feet, while individual peaks tower up to 17,000 and 18,000 feet, as in the still faintly volcanic peak of Elbruz, 18,500 feet, and Kazbek, 16,500 feet; both of these peaks are, however, on the northern or European side of the main mass of the Caucasus. The highlands of Syria rise gradually from the neighboring deserts in the ranges known as the Lebanon and Antilibanus to heights respectively of over 10,000 and 9000 feet, and slope steeply in terraces down to the narrow coast lands of Phœnicia and Palestine. The peninsula of Arabia is a table-land of moderate height, continuous with the Syrian desert, and bordered by low mountain ranges. In the extreme south the mountains attain an elevation of nearly 8000 feet. Arabia is separated from the Armenian plateau on the north by the valleys of the Tigris and Euphrates. Most of its area is desert, but in the interior the plateau reaches an elevation sufficient to induce enough rainfall for the cultivation of crops; this is, therefore, the populated region.

South of the Himalayas, at the head of the peninsula of India, is a depression drained on the east by the Ganges, and on the west by the Indus. The Ganges Valley is the densely populated region of India. East of the Lower Indus is the desert of Sindh. Farther south on the peninsula is the plateau of the Deccan, which rises to an average height of from 1500 to 2000 feet. It is separated on the west from the narrow coast-level of Malabar by the Western Ghats; on the east, from the broad level coast of Coromandel, by the Eastern Ghats; on the north it is separated from the low plains of Hindustan by the Vindhya and Malwa mountain chains; and on the south the Ghats unite at the sources of the Kaveri forming the Nilgiri, or Blue Mountains, 8760 feet high, the loftiest chain in the peninsular portion of India. Burma and Assam are crossed by numerous mountain groups, which extend in broken lines from the interior of Tibet to the extremity of the Malay Peninsula. China Proper and French Indo-China have mountainous interiors, while the whole eastern coast-line of Asia from Korea northward is paralleled by lines of highlands. The Japanese Archipelago may be regarded as a submerged mountain chain rising from the immense depths of the Pacific and reaching with the Kurile Islands northward to Kamchatka. The chain is crowned by numerous volcanic cones, and throughout its extent earthquakes and seismic disturbances are frequent phenomena.

Hydrography. The hydrography of Asia displays as striking a variety as does the structure of its land surface. The Asiatic Alpine regions send down, in some directions, torrents of water, which form rivers almost rivaling in magnificence those of America, and which flow for hundreds of miles through plains of unsurpassed fertility. On the other hand, there are wide-stretching tracts similar to the deserts of northern Africa, and of equal sterility.

The seven great river systems of Asia are: the Mesopotamian, that of northwest India, that of northeast India and Tibet, the Indo-Chinese, the Chinese, the Siberian, and that of the Kirghiz steppe and Russian Turkestan. The first comprises the two famous streams, the Tigris and Euphrates, flowing into the Persian Gulf; the second comprises the Indus with its tributaries; the third system comprises the Brahmaputra and Ganges; the fourth comprises the rivers of the Indo-Chinese Peninsula, the chief of which are the Irrawaddy, the Salwen, the Menam, and the Mekong; the fifth system is the Chinese, comprising four great streams, all of which flow in an eastern or northeastern direction into the Pacific—the Si-Kiang, the Yang-tse-Kiang, the Hoang-ho, and the Amur; the sixth system comprises the large rivers of Siberia, the principal of which are the Obi, the Yenisei, and the Lena—all have their source in the ranges bordering Siberia on the south and flow northward, traversing the great plain for eight or nine hundred miles before their sluggish waters reach the Frozen Sea; the seventh system comprises the Ural, which flows into the Caspian Sea, and several other inland rivers, including the Amu Darya and the Syr Darya, flowing into the Aral Sea, the Ili, which flows into Lake Balkash, and the Tchui.

Asia is deficient in lakes. At the base of the ranges limiting Siberia on the south, are, however, several of magnitude, among them Baikal, Balkash, and Issikul. Farther west, in the depression east of the Caucasus, are the Aral and Caspian seas, which have no outlet; the Caspian Sea is 85 feet below the level of the sea. In Syria is the Dead Sea, occupying with its valley a deep depression, the surface of the lake being about 1300 feet below sea-level. In the Armenian Mountains are lakes Van and Urumiah, lying at great elevations and having no outlets. In Tibet and the Desert of Gobi lakes without outlets are numerous, since, owing to arid conditions, drainage systems are not yet developed. A



COPYRIGHT, [illegible], BY [illegible] MEAD & COMPANY large part of Asia, comprising Tibet, Mongolia, Turkestan, and most of Baluchistan, Persia, and Arabia, that is, nearly all the central and southwestern parts of the continent, the region in which the rainfall is deficient, has no drainage to the sea.

GEOLOGY. Little is known of the geology of the greater part of Asia. Certain limited regions, such as India, have been studied in detail, but our knowledge of the greater part of the continent has been derived from piecing together the reports of explorers. The great mountain systems consist principally of granites, gneisses, schists, and allied rocks, with, in many cases, the older stratified rocks lying on their flanks. This is the case with the Himalayas, whose uplift is believed to have occurred as late as Tertiary times and with the Tian-shan, Altai, Stanovoi, and the Kuenlun ranges. The Ural Mountains, also, have a metamorphic nucleus. In the Caucasus, in Armenia, the Vindhya range of India, and in Persia, are extinct volcanoes, which have contributed lava and ashes to the building of the mountains, while in the peninsula of Kamchatka, the Japanese Islands, and the East Indies are many active cones. Indeed, this region on the east and southeast of Asia is one of the largest and most active volcanic regions on the earth.

The vast plain of Siberia is floored in succession from east to west with stratified beds, ranging from the oldest to the youngest, with large areas of eruptive and metamorphic rocks. The Desert of Gobi and the Plateau of Tibet are, except for the mountain ranges, floored with Tertiary and Quarternary beds. In China, however, the rocks are much older, consisting of Carboniferous and Jurassic beds, which in the low coast regions underlie great beds of loess with which much of the level country is covered. The western plateaus in Afghanistan, Baluchistan, Persia, and Asia Minor are in the main covered with Tertiary and Quarternary rocks, but in Arabia a large part of the plateau is floored with Jurassic beds. The great depression of northern India, south of the Himalayas, is a Tertiary deposit and a part of a large land area that once extended across the Indian Ocean to South Africa. The peninsula itself is composed of metamorphic and igneous rocks, with here and there areas of Paleozoic beds. Glaciers are found chiefly in the high mountain regions of the Tian-shan, Kuenlun, and Himalaya ranges, in the Tibetan highland, and in the Caucasus. No glaciers are found near the Arctic coast, owing to the deficient precipitation. See Geology, under INDIA; CHINESE EMPIRE.

CLIMATE. Asia has a great variety of climate, owing to its range of latitude, altitude, and its relations to the bordering seas. It is in the main a continental climate, with light rainfall, a dry atmosphere, and great extremes of temperature. Near the coasts the climate is modified by the proximity of the sea, but this influence extends but a short distance inland, as the prevailing winds are off the land, except in the south, and even there the contrary is the case only during the prevalence of the monsoons. The whole of northern Asia lies within the range of the prevailing westerly winds of the Northern Hemisphere, in which are found the extensive cyclones and anti-cyclones which give variability to the weather in temperate latitudes. On the eastern and southeastern coasts, cyclones of the hurricane type originate in the region of the tropical islands, and, pursuing a course at first westerly, under the influence of the trades, gradually turn toward the north and east, often ravaging the coast to some distance inland. In the extreme southern part of Asia occur general storms of hurricane character and local storms of the tornado form.

TEMPERATURE. The mean annual temperature in Asia reduced to sea-level, decreases uninterruptedly from about 90° F. at the south to 0° at the north. On the eastern coast the decrease in temperature, with increase in latitude, is somewhat slower than in the interior, but on the whole the isotherms follow the parallels quite closely, especially in the southern half of Asia. The isotherm of 32° crosses eastward from Archangel with a slightly southerly bend, to the mouth of the Amur. On the western side of Asia the temperatures decrease from 72° at Suez to 14° at the northern end of the Ural Mountains. On the eastern coast there is a decrease from 78° in Siam to 10° at Bering Strait. The region of greatest cold is near Verkhoyansk, in Siberia, on the Yana River, but a short distance north of the Arctic Circle, between the meridians of 130° and 140° E.

The average temperatures for January decrease from about 80° at the south of the continent to —55° in the neighborhood of Verkhoyansk, whence there is an increase to —40° on the coast. From Verkhoyansk, the centre of cold, the temperature rises in all directions; westward along the Arctic coast to —4° at the northern end of the Urals, and eastward to —13° at Bering Strait. On the western side of the continent the temperature decreases from 57° at Suez to —4° in the northern Urals. On the eastern coast the temperature decreases from about 80° at the south to —13° at Bering Strait. The isotherms in the northern part of the continent swing far to the south in the interior, showing much lower temperatures there than on the coasts in winter. The isotherm of 32 runs nearly due east from the middle of the Caspian Sea to the middle of the Yellow Sea, showing in this latitude little difference in winter temperatures between the coast and the interior. Throughout the greater part of northern Asia the January temperatures are more than 18° below the normal for those latitudes, and at Verkhoyansk it is 47° below normal, owing to the distance from the sea and its influences.

In July, the highest temperature is on the Arabian and Persian plateaus, where the average is 93°; from this section there is a fall to 82° in southern India, southern Siam, and southern China, and toward the north and east, to 39° throughout most of the Arctic coast. The maximum temperature of the whole continent ranges from 120° in Persia and Arabia, to 75° on the northern coast, and in the northern interior it reaches 100°. The minimum ranges from about 65° in the extreme south, to —58° on the northern coast, but in the neighborhood of Verkhoyansk, in the interior of northeastern Asia, a temperature of 92° below zero has been observed.

RAINFALL. In most regions of Asia, except near the Pacific coast and south of the Himalayas, the rainfall is scanty. On the immediate coast of the Arctic Ocean in Siberia, the annual precipitation is under ten inches. Elsewhere in Siberia it is between ten and twenty inches.

In the great desert regions of Gobi, the Caspian and Aral Sea regions, and in Persia, it is below ten inches. In most of Arabia it is below ten inches, except in the higher plateau of the interior, where it reaches twenty inches. In Manchuria the rainfall increases to 30 inches, and in China it increases southward from 30 inches in the north to 40 inches at the mouth of the Hoang, to 70 inches in the southern part, and is 80 inches in Japan. The Malay Peninsula has an excessive rainfall. In the Himalaya region the rainfall on the southern slopes sometimes amounts to over 160 inches, in one limited region to 475 inches, and for much of the southeastern coast region of India it reaches from 120 to 160 inches; but it decreases very rapidly west of Calcutta, and on most of the Deccan Plateau it is only 20 inches, increasing again on the western coast to from 40 to 160 inches. The heaviest annual rainfall in the world occurs in Assam, to the south of the eastern Himalayas, where a precipitation of 800 inches is on record. While the normal rainfall for southern Asia may be estimated at from 40 to 60 inches, yet wherever a mountain range intercepts the moist winds blowing from the Indian Ocean, a rainfall of from 140 to 160 inches occurs on the windward side of the mountains, and usually of from 20 to 40 inches on the leeward side. Northern Asia has rain at all seasons, except in the deserts, where rain seldom falls. Southern Asia, including India and the Malay Peninsula, is subjected to periodic rains, the maximum occurring in summer, the period of the southwest monsoons.

Winds. While southern Asia is in the region of normal winds, the trades, yet these winds are very much, sometimes totally, changed by the monsoons. During the summer season the interior of the Continent becomes intensely heated, and the surface winds blow inward from the south, forming the southwest monsoon; the air thus brought inland is saturated with moisture, which it discharges freely on being cooled in passing over hills or mountain ranges. This monsoon character of the winds has a very marked effect on the rainfall of southern Asia, and it is due to the summer monsoon that the great precipitation occurs on the windward side of the Asiatic highlands bordering the coast.

Flora. Along the Arctic coast there is a barren region from 150 to 500 miles wide, the Tundra, where only dwarf Arctic plants and mosses grow. South of this is an extensive region of forests, mostly coniferous in the north and deciduous trees in the south. To the southward of these are great areas of pasture land which extend to the borders of the deserts. In the greater part of central and western Asia the vegetation is of desert-like character, but wherever the rainfall is sufficient there is the vegetation common to the moister temperate climates. South of the Himalayas the flora is essentially tropical, and mostly occurs with the luxuriance belonging to the well-watered hot zone. The northern part of the continent differs little in general character of its productions from the corresponding parts of Europe and America. Pines, birches, and willows form, as in the other continents, the last forests of the north; but on account of the more severe climate, they do not reach a limit so far northward as in Europe. Some of the common plants of Europe are abundant as far east as Kamchatka; the crowberry (Empetrum nigrum), so plentiful on the moors of Scotland, is still more plentiful throughout Siberia; the same Bilberries (Vaccinium) and Brambles (Rubus) abound in Kamchatka as in Scandinavia. There, are, however, interesting differences. Heathers are comparatively rare in Asia, its flora agreeing in this respect with that of America rather than with that of Europe. The larch extends far northward, at the mouth of the Obi, to the utmost limits of arborescent vegetation. In Kamchatka, a different kind of birch replaces the common birch of Europe as a forest tree, and the Siberian stone pine is different from that of the south of Europe. Siberia in its less frigid and dry regions produces a rich vegetation, of which herbaceous plants, of a size unusually large for a cold or temperate climate, are a characteristic feature; among these may be mentioned species of rhubarb, angelica, and cow-parsnip. In the abundance of currants the warmer parts of Siberia resemble North America, although most of the species are different.

To the south of the Altai Mountains in the Desert of Gobi and the plateau of Tibet the flora is very poor and scanty, owing to the severe climate and the scarcity of rain. The flora of Asia Minor and of the watered parts of Syria has a general resemblance to that of the south of Europe, although exhibiting also features which belong rather to that of India or of Africa. Shrubby members of the Mint family are particularly characteristic of this region. The tropical flora of Arabia abounds in trees which yield fragrant balsams and resins, particularly those of the order Amyridaceæ. Indeed, both the warmer temperate and the tropical regions of Asia excel other parts of the world in the number and variety of the odoriferous drugs which they produce, from myrrh and frankincense to asafœtida. Arabia has long been noted for the production of coffee, which is now also extensively cultivated in other warm parts of Asia. The date-palm is as characteristic of Arabia as it is of Egypt. Acacias and mimosas also abound. The flora of Persia in part resembles that of Arabia, although it is less tropical in character and the altitude of its mountains gives to it in some places a different character. The abundance of Scitamineæ is regarded as particularly characteristic of India; the plants of this order yield ginger, galangal, cardamoms, turmeric, and other articles of commerce, among which not the least important is a kind of arrowroot. Members of the Pea family are also very numerous, both herbaceous and shrubby, or arborescent; many of them exhibiting great beauty of foliage and splendor of flowers, and some producing useful kinds of pulse; others, timber, gum, medicines, etc. The number of valuable medicinal plants which belong to the Indian flora is very great, as is also that of dyewoods; and fine fruits, of which the mango and mangosteen may be particularly noticed. Cucurbitaceæ (gourds) are very numerous; as are also trees of the genus Ficus (fig), some of which produce caoutchouc, and among which are the sacred Peepul and the Banian-tree, so remarkable for the roots which descend from its branches to become new stems, and for the extent of ground which it canopies.

Palms are numerous in the tropical parts of Asia, and particularly in its southeastern regions, but are less numerous than in the tropical parts of South America. The cocoanut is one of the most common palms in the vicinity of the sea. Some of the Asiatic palms are valuable for the sago which they yield. The natural order Dipteraceæ is one of those peculiar to India and southeastern Asia, and includes some of the noblest timber trees, including teak, so valuable for ship-building. The flora of the Indo-Chinese peninsula, and of the southeastern part of Asia generally, differs from that of India, and exhibits, if possible, a richer variety. The change from the Indian flora is still greater in the islands, and a resemblance to that of Polynesia and of Australia begins to appear. The bread-fruit takes the place of its congener, the jack of India. These regions produce nutmegs, cloves, and other spices. The Lauraceæ are abundant, yielding cinnamon, cassia, and camphor. China and Japan have many plants peculiar to themselves, and are remarkable for the prevalence of the Ternstrœmiaceæ, the natural order to which the tea-plant and the camellia belong. The Himalaya Mountains possess a flora very different from that of the Indian plains, and in some of its most characteristic features, particularly in the prevalence of large rhododendrons and magnolias, it has been found to agree remarkably with the flora of the southern parts of the United States; while at still greater altitudes there is a strong resemblance to that of more northern regions; forests of pine appear, and along with them the deodar, a cedar resembling the cedar of Lebanon. The mountains of Java also produce oaks and other trees resembling those of the temperate zone, although the species are peculiar. An important element in the flora of the lowlands of southern and eastern Asia is the bamboo, which often attains to gigantic proportions.

Many of the cultivated plants of Europe are known to be natives of Asia, and others are supposed to be so. Among the economic plants are rice, wheat, barley, oats, rye, maize (introduced), potato (introduced), beans, peas, buckwheat, millet; and in the south banana, plantain, yam, cacao, sugar-cane, tobacco, spices, cotton, poppy, hemp, flax, and corchorus.

Fauna. Sclater and Wallace divide Asia into two great regions. North of the Himalaya range lies the great Palæarchis region, while to the south of it is the Oriental zone. The climatic extremes of the former, with its long and intensely cold winters, and its warm, short summers, are not favorable to animal life. Mammals, of which there are forty-one families, are found throughout the region. Birds, of which there are fifty-eight families, are common, and most of the genera of northern and central Europe are found here. Partridges and grouse are plentiful; the most northern birds are the Alpine ptarmigan, the snow bunting, the raven, the gyrfalcon, and the snowy owl. Reptiles (25 families) and amphibia (10 families) are comparatively scarce, especially in the northern section. Of fresh-water fishes there are thirteen families. The insects as a whole are of European character, butterflies being especially numerous. The Oriental region, while it is comparatively limited in extent, has an exceedingly rich fauna, which is isolated from the Ethiopian fauna on the west by oceanic and desert barriers, and from the Palæarctic on the north by mountainous and desert barriers. In this region are found 35 families of mammalia, 71 of birds, 35 of reptiles, 9 of amphibia, and 13 of fresh-water fishes. The warm climate of this region is especially conducive to the sustenance of animal life in great numbers. This is especially noticeable as regards birds, reptilia, and insects, which are found in great numbers.

Among domesticated animals belonging to Asia, the most important are the ox, reindeer, and buffalo, the sheep, the goat, the horse, the ass, the camel, and the elephant. A number of species of ox and buffalo are natives of Asia. Very distinct from all the others is the yak of Tibet, which is to the inhabitants almost what the reindeer is to the Laplander. The sheep and goat, the horse and ass, are natives of the mountainous parts of central Asia. The camel is almost indispensable as a beast of burden and of food in the deserts. It is used principally in central and southwestern Asia. The elephant is a native of the tropical parts of Asia, and is of a different species from that of Africa.

To attempt to deal more particularly with the Fauna of so extensive and diversified an area as is covered by the title Asia would be impracticable and is unnecessary in view of the fact that under the titles of its subdivisions, such as India; Persia; Himalayas; Siberia; etc., the local faunal characteristics will be treated in detail.

Ethnology.

Within the limits of the Asiatic continent are included all the five great races of man. The number, however, of Amerinds, or Red Men, is so inconsiderable, and the absolute proportion of the negroid peoples so small, that, roughly speaking, the entire population of Asia and its islands may be said to consist of the three great races, the white, the yellow, and the brown, or, as they are commonly known, the Caucasian, the Mongolian, and the Malay.

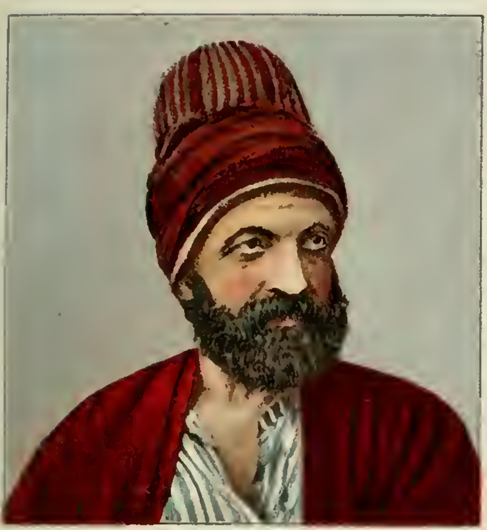
The White Race. The white inhabitants indigenous to Asia, as opposed to white Europeans who have but recently entered the continent, constitute about one-tenth of the total population, and are found in Arabia, Asia Minor, the region of the Caucasus and Siberia, Persia, Afghanistan, Baluchistan, the great Indian Peninsula. Though it is possible that the Semite branch of the great white race came originally from Northern Africa and the Aryan branch from Europe, it nevertheless is true that from remote antiquity these families have been found on Asiatic soil, and that it was in Asia they acquired those physical characteristics and developed the peculiar form of genius which mark them to the present day. This race presents within itself a wonderful diversity of type, both mental and physical; in color of skin, in shape of the head, and in the general structure of the body, there is a great difference between the Arabians, for instance, and the inhabitants of the Caucasus region. So, too, the race embraces peoples in various stages of civilization, ranging from the agricultural Hindus, with their great cities and highly developed political institutions, down to the nomad tribes of the Arabian deserts or the mountain-dwellers of Afghanistan. Of the three subdivisions of the white race, the Aryans, the Caucasians in the narrow sense, and the Semites, the two former seem to have been the original occupants of Asia Minor, and of the two, the Aryans seem by far the more important. Indeed, the influence of the *Caucasian* population, comprising the Georgians and the Mingrelians, with their related tribes, the Lesghians and the Circassians, upon the Aryo-Semitic culture of Asia Minor, must have been exerted in prehistoric times. Both Aryan and Caucasian yielded before the *Semite* peoples, who advanced from the interior of the Arabian Peninsula and spread over the region from Mesopotamia to the Mediterranean. The Semitic tribes became differentiated into three groups, the Aramaic, including the ancient Babylonians, Assyrians, and Chaldeans; the Canaanite, including the Philistines, the Hebrews, and the original inhabitants of Palestine; and the pure Arabian group, which comprised those who remained in the Southern Peninsula. Of the three stocks, only the Jews, as representatives of the second, and the Arabs, have survived. Farther to the east, on the plateau of Iran, the highlands of Pamir, and in the plains of India, lived and still lives the third branch of the white race—the *Aryan* or Indo-Germanic, which may be subdivided into the two great groups of Indians and Iranians. The former would include the ancient peoples whose tongue still survives in literature as the Pāli and Prākrit, and the modern Indian stocks of the Bengali, Sindhs, Hindustani, Marathi, Gujerati, Punjabi, and Nepali. The Iranian group would comprise the old and new Persians with their related stems, the Kurds and the Beluchis, the peoples of Afghanistan, and, lastly, the Armenians. In addition to the definitely determined members of the white race some ethnologists are inclined to find Caucasian elements in such peoples as the Khmers of Cambodia, the Miao-tse of southern China, and the Aino of Japan; these, however, for lack of authoritative information must be relegated to the category of unclassified breeds. Finally, there has undoubtedly been a considerable infusion of Aryan blood into the Mongolian hordes in some parts of Tibet, China, Farther India, and perhaps some of the neighboring islands.

In the history of civilization the part played by the white race of Asia is of surpassing importance. The great empires of antiquity arose among the Semites of Mesopotamia and the Aryans of Iran and Hindustan. The art of writing, literature, the sciences, political institutions, were developed here to a higher degree of perfection than even in ancient Egypt. Above all, the white race in Asia has been the promulgator of the world's great religions. From the Asiatic Semites came Judaism, Christianity, and Mohammedanism—three faiths which embrace the whole western world. From the Asiatic Aryans came Zoroastrianism with its great principle of the conflict between good and evil, destined subsequently to influence the Jew and the Christian; Brahmanism, which is the ritualistic and sacerdotal expression of the Aryan nature; and Buddhism, which may be considered as the Aryan anticipation of Christianity. From the last developed Jainism and Lamaism. The spread of Aryan Buddhism in Eastern Asia, with its influence on the social life of the people corresponds to the expansion of Semitic religions in the West.

THE YELLOW RACE. The yellow race is the most typically Asiatic of all. It numbers seven-tenths of the population of the continent, and covers practically all its extent outside of the domains of the Aryo-Semites—into which, indeed, it has not failed to intrude, first in prehistoric ages and again in modern times, with the result that there is a large Mongolian element in the Caucasians of Asia Minor, Afghanistan, Beluchistan, and India. The race may be divided into two great geographical groups—one in the north, embracing all the tribes of Siberia and Turkestan, with their centre somewhere near the Altai Mountains; the other in the south, comprehending the peoples of China and Farther India, with their primitive home in the mountains of Tibet. (1) The Siberian branch of the yellow race includes a large variety of stocks. In the extreme north, on the borders of the Arctic Ocean, live a handful of aboriginal groups, the survivors of numerous tribes which lived there in ancient times, destined themselves to speedy extinction. Such are the Yukaghirs, the Tchuktchis, the Namollos, the Koriaks, and the Kamchatkans, numbering in all about ten thousand. Farther west is the great Ural-Altaic stock, consisting of a large number of families which are themselves subdivided into powerful tribes. These include the Samoyed group, which comprises the Yenisei and the Ostiaks, living near the shores of the Arctic; the Finno-Lapponic group, including the Votiaks, Mordwins, and Voguls, dwelling in the neighborhood of Tobolsk, Tomsk, and the Ural Mountains, as well as the Magyars of Hungary and some of the population of the Balkan region and European Russia, now Aryanized as to speech; the Turko-Tatar group, Yakuts, Uigurs, Turkomans, and Khirgiz, occupying a vast territory in Southwestern Siberia and Central Asia; the Mongol group, subdivided geographically into North Mongols, the East Mongols, and West Mongols (Kalmuks), with their centre of population around Lake Baikal, but found also in the region bounded by the Volga, the Don, the Caucasus, and the Caspian Sea, and in China; finally, the Tunguse group, consisting of the Tunguses proper, the Manchus, and the Orotong peoples which dwell in the forests of Eastern Siberia and extend into Northern China. To the Siberian branch also belong the Japanese, the Koreans in part, the natives of the Liu-Kiu Islands, and, some would have it, the Aino. In Turkestan and the region of the Caucasus are minor peoples of mixed origin, who belong by language or by blood to the Siberian branch of the yellow race.

(2) The southern branch of the yellow race, the Sinitic or Tibeto-Chinese, embraces the Chinese proper, with many variations in language and much mixture of blood; the Tibetans, to whom should be added as related by blood more than by language, minor peoples of the southern slope of the Himalayas; the races of Farther India, comprising the Annamese, the Burmese, the Siamese, the Cambodians, the Karens, the Khamtis, and a number of others. In addition, some ethnologists make the Malays and Polynesians, and even the Amerinds, mere subdivisions of the yellow race. The two great branches of the yellow race diverge in the mode of inflecting their language, just as the two great branches of the white race in Asia, the Semites and the Aryans do, the Siberian peoples possessing polysyllabic agglutinative vernaculars, while those of the Chinese peoples are monosyllabic,

YELLOW RACES OF ASIA



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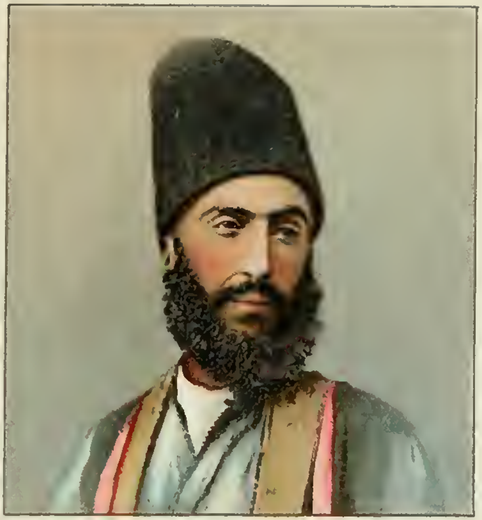

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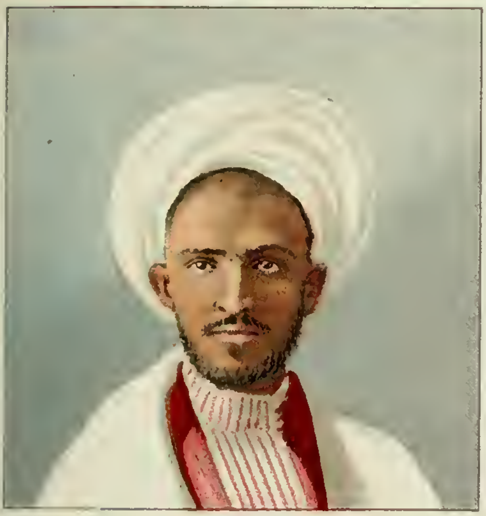

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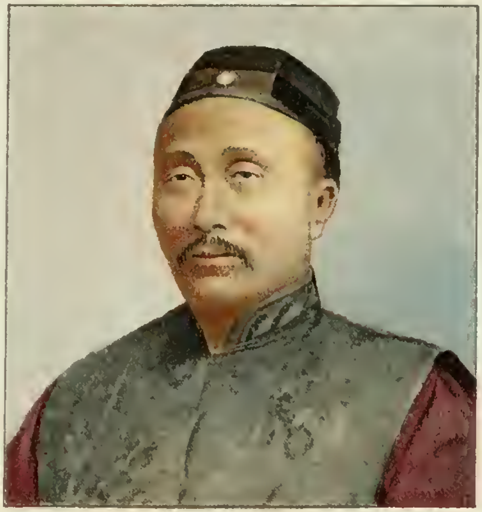

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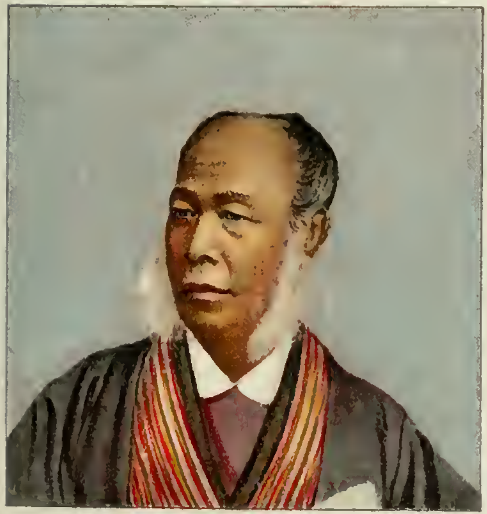

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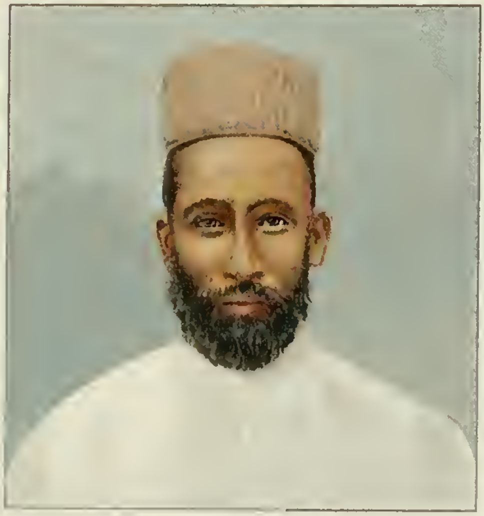

EAST INDIAN TYPE

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isolating. The Japanese language is polysyllabic and akin to the Manchu, though its alphabet has been adopted from the Chinese. The theory which made the yellow race the first inhabitants of most of Europe and of all of Western Asia (Turanians, Accado-Sumerians, etc.), seems no longer tenable; neither can it be asserted that the oldest culture of the yellow race in China, Korea, and Japan is either a copy of the old Babylonian civilization or the result of comparatively recent Aryan influence. Chinese civilization must be regarded as having originated with the removal of the prehistoric races from the plateau of Tibet to the rich river lands of Eastern China, just as Aramaic civilization originated with the immigration of the Semites of Arabia into the plains of Mesopotamia. Chinese civilization, therefore, may be considered as the first great accomplishment of the yellow race. The characteristics of that civilization—inveterate conservatism, general apathy, and unlimited submissiveness—should not, however, be considered as inherent in the race, one great branch of which, the Japanese, have only recently demonstrated the possession of quite the opposite qualities. The Siberian members of the race are more notable for what they have done in Europe than for the part they have played in Asia; the mighty empires of Genghis Khan, Timur, and Baber were not enduring; on the other hand, the inroads of the Bulgarians, Finns, and Magyars into Europe have produced lasting results.

THE BROWN RACE. The Malayan or Malayo-Polynesian peoples are denied by many ethnologists the position of a race, and are regarded as merely the insular and oceanic divisions of the yellow race. Their primitive home was somewhere in the neighborhood of the peninsula of Malacca, the situation of which favored the distribution of the stock over the islands of the Indian and Pacific oceans. Physically the Malays of the continent stand nearer to the Tibeto-Chinese branch of the yellow race, while the Polynesians come closer to the Siberians. Linguistically, both Malays and Polynesians are connected with the Siberians, rather than with the Tibeto-Chinese. The brown race includes the Malays proper of Malacca, the Sundanese and Javanese of Java, the tribes of Sumatra, Borneo, Celebes, and Formosa, and the inhabitants of the Philippines, where the most important family is that of the Tagals. Lastly, there are the Polynesians and the Micronesians, all over the Pacific, and the Hovas of Madagascar. The presence of branches of the Malays in such widely scattered regions as the Philippines, Hawaii, Madagascar, and New Zealand evidences the wonderful power of expansion possessed by the race. Its capacities for culture have been demonstrated in New Zealand, where it has attained its highest development. There the Maoris are on terms of equality in every way with their white fellow-citizens, enjoying representation in Parliament and a share in the Government. Malay elements are discernible in New Guinea, Northern Australia, the interior of Farther India, Southern Hindustan, and its adjacent islands, parts of China, and even Japan. Indeed, there is good reason to believe that it is the addition of the Malayan element that has made in great part the difference between the Japanese and the Chinese.

OTHER RACES.

The Black Race.—Examples are the Negritos of the Philippines, the Papuans and their Melanesian kindred, the Andaman islanders, and a few small tribes in the Malay Peninsula, such as the Sakai and the Semangs. Some ethnologists maintain that the white, yellow, and brown races were preceded all over southeastern Asia and a great part of the Malayo-Polynesian area by tribes of the black race, which they regard as nearer to the original human stock. It would seem, however, that the yellow race, from its nearness to the type of the child, and for certain psychic reasons, has an equal claim to this distinction.—*The Red Race.* In the extreme northeast of the continent, about East Cape, dwell the Yuit, a people of Eskimo stock, whose numbers were much larger formerly. As immigrants from Arctic America, these Yuit represent the Amerinds or red race of America. Some of the Aleuts also, who belong to the Eskimo stock, have wandered from island to island until they have reached the Asiatic coast, while a few have been transferred thither by the Russians.—*Peoples of Doubtful Affinities.* Such are the Aino of Japan, the Miao-tse and perhaps some other primitive peoples of China, some of the tribes of Formosa, the Cambodian Khmers, the Veddas of Ceylon, and the Dravidian and Kolarian peoples of Southern India. Of these, the Aino represent probably a very ancient mixture of primitive white and yellow races, and the same may be true of the Miao-tse and the Khmers. The Formosans seem largely Malayan. The Dravidians more by language than by physical type stand distinct from the mass of Indian natives, and though ethnologists are inclined to group them with the Australians, they represent, more probably, a mixture of early negroid, yellow, and white types. They are now considerably Aryanized in culture and assimilated more to the type of the white race in India. The Veddas, one of the most primitive peoples in existence, are an older, mixed people of similar ancestry. Some of the Dravidian peoples (Tamil, Telugu, etc.) have shown themselves capable of a high degree of culture, while others still linger in barbarism.

THE ORIGIN OF MAN. The oldest evidences of a high order of civilization in Asia (belonging, in all probability, to the white race) exist in Asia Minor; the most ancient remains of individual man may be looked for in the southeastern region of the continent. Man's precursor, the *Pithecanthropus*, was discovered in the Pliocene deposits of Trinil, in Java, in 1891, by Dr. Dubois. Somewhere in Southeastern Asia, then, possibly, individual man was born, just as somewhere in Southwestern Asia men in society laid the foundations of the first great civilizations.

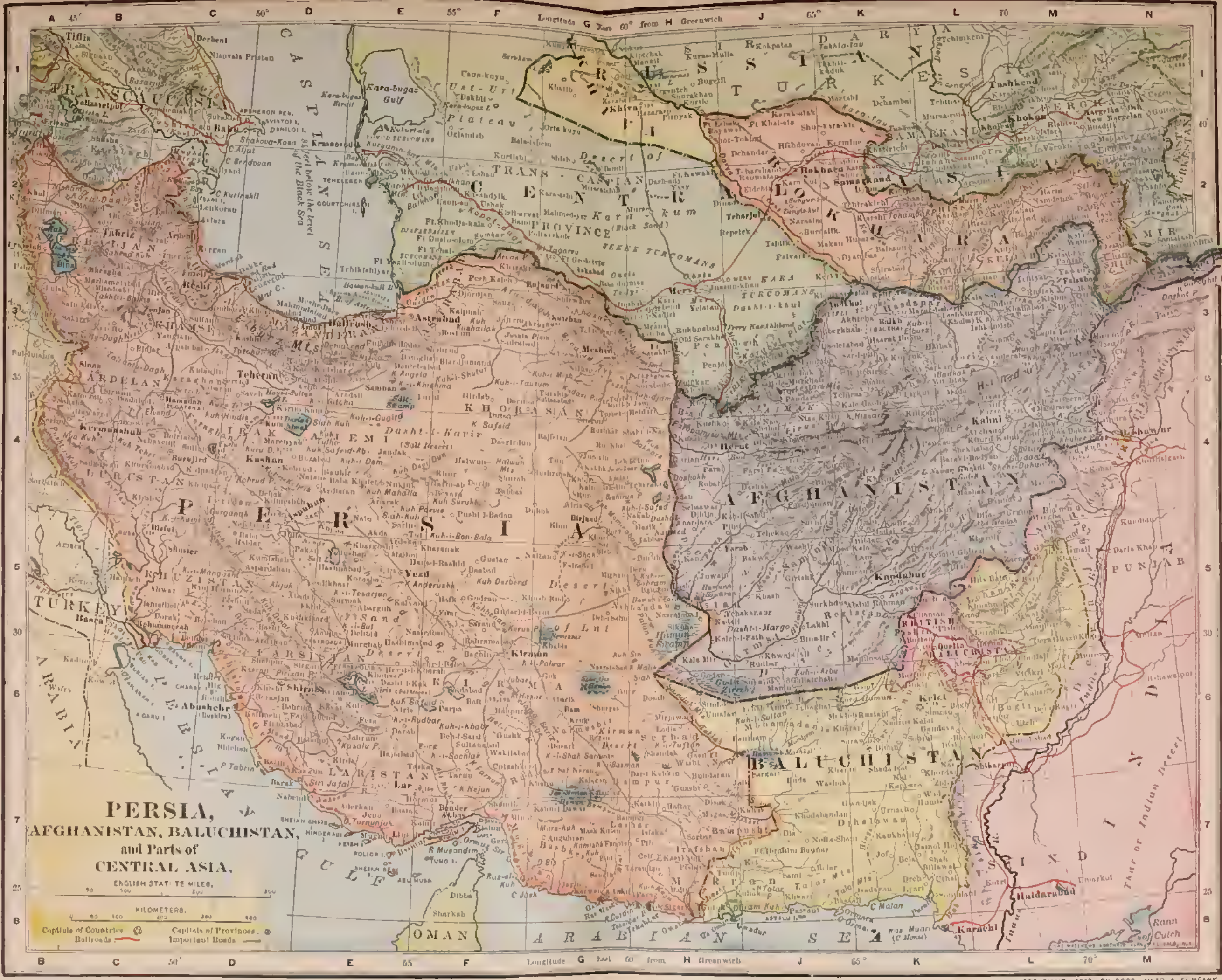
GENERAL HISTORY.

It was characteristic of the social groups of Asia that they early attained the limit of their development and settled into grooves in which their life ran for ages. (See under ASSYRIA, BABYLONIA; CHINESE EMPIRE.) After the rise of the great Medo-Persian Empire under Cyrus (q.v.), Southwestern Asia was brought into contact with the earliest European civilization, that of the Hellenic people, and a contest for supremacy took place. (See GREECE; and PERSIA.) This was terminated by the triumphant march of Alexander the Great (q.v.) eastward to the Indus and the establishment of the Hellenistic kingdoms. The Roman Empire gathered in this Hellenized portion of the old East. The rise of Mohammedanism created a new religio-secular power in the southwest which, when the warlike Turkish tribes from the interior became dominant in the Mohammedan world, wrested all of its Asiatic provinces from the weakened Eastern Empire. The Crusades (Eleventh to Thirteenth centuries) were the last mediæval struggle for possession between the West and the East. The rise of the Ottoman power made Asia once more a menace to Europe. (See MOHAMMED; CALIPH; ABBASSIDES; OMMIADS; SELJUKS; CRUSADES; TURKEY.) The march of events in the southwest cut off the rest of Asia completely from the Western world, depriving the latter of even such incomplete knowledge of the vast Oriental continent as was possessed in antiquity, when there were trading routes to the farther East through Bactria. The stationary character of Asiatic civilization, and the lack of initiative among the mass of the people, prevented the great social and political changes that make the general Continental history of Europe so full of meaning. Until the advent of the European powers there was little of this general history for Asia, except in connection with the great waves of conquest which rolled over the continent. These are treated in the articles GENGHIS KHAN; KUBLAI KHAN; MONGOL DYNASTIES; TIMUR; and MOGUL, GREAT.

A new era opened with the rediscovery of the East by Europe in the Fifteenth and Sixteenth centuries. Portuguese navigators and traders followed in the path of Vasco da Gama (1497-98) and established factories at Goa and Macao, and in other places. Spain took possession of the Philippines in 1565, as a result of Magellan's epochal voyage across the Pacific. The Dutch were also among the early comers. The pushing Western nations, in pursuit of commercial advantage, thereafter steadily increased their influence and gradually acquired control of depots or considerable territory in India, the East Indies, and China. In the middle of the Eighteenth Century an apparently insignificant phase of the Seven Years' War was fought out in India between the English, led by Clive, and the French, under Dupleix. The fate of that country of ancient and warring nations was determined by the English triumph. The advance of European influence may be followed in this work through the history of the different countries affected thereby. In the meantime, the expedition of the Cossack partisan leader Yermak across the Urals (1580-82) into what is now Siberia began the steady movement of Russia into Central Asia and across the continent to the Pacific. (See RUSSIA; and SIBERIA.) These latter movements brought the impulse of Western life into the development of Asia, and with it the complications of European politics, the sharp rivalries for political influence in the interest of commercial expansion, and the active modern competition with railway and steamship. The rapid growth of world politics has given a new significance and unity to the history of Asia. The details of this later period of transformation may be followed in the histories of the several countries, especially CHINESE EMPIRE, JAPAN, INDIA, and RUSSIA. See also the article FAR EASTERN QUESTION, and the references therewith.

POLITICAL DIVISIONS. In the political affairs of Asia, as in those of the African continent, the predominance of European influence has become marked during the last 200 years, though the power of the European nations has not been as completely established over the native races of Asia as over those of the Dark Continent. Still, reference to the table appended to this article will show that nearly two-thirds of the area of Asia, and nearly one-half of its population are under the control of the European powers, and even in the unappropriated area and over the nominally independent peoples, the ascendancy of Western culture, spreading mainly through the channels of commerce, is rapidly being established. While China, Siam, and Persia are as yet autonomous, the play of European politics is rapidly becoming the guiding force of their national life. Ultimately Siam seems destined to be annexed to the Indo-Chinese Empire, which France has built up in Farther India; Persia at present is a stake in the political game going on between Great Britain and Russia; and China, by reason of its huge size and the immense opportunities it promises for exploitation, has awakened the ambitions of all the nations of Europe. Japan alone has safely grounded its national existence, because its people have shown an aptitude for adopting the civilization of the Europeans without falling under the power of their civilizers. The striking fact, then, about conditions in Asia at the present time, is that the continent which first gave civilization to the world has in turn become subject to the higher state of civilization to which Europe, favored by many circumstances, has attained. The struggle for supremacy is much more acute in Asia than in Africa, because in the former country European culture has no free field to work in, and finds itself confronted by political and religious systems of great antiquity and of sufficient strength to render powerful resistance. In the southern part of Asia there is not any room for the influx of European colonization, as there is in the sparsely settled continent of Africa. With an area exceeding that of Africa by one-half, the Asiatic continent has about five times its population, and therefore the establishment of European domination must mean not so much the actual occupation of the soil by the Western nations as the control of the native races by the European powers, acting through the long-established machinery of local government and ancient forms of life. The rôle played by Russia in Siberia, however must be distinguished from the part played by the other nations in southern Asia; for Siberia, the Russian provinces in Central Asia, and the Caucasus region are in reality not foreign possessions, but constitute an integral unit with the Russian Empire in Europe, from which the first two are separated by no considerable physical barriers. The plains of Siberia are a continuation of the South Russian steppes, and the nomad inhabitants of Siberia are closely akin to the Tartar peoples that dwell on the lower Volga and the Caspian. Finally, the vast stretches of Russian Asia, with their mere sprinkling of inhabitants, afford such an opportunity for European colonization as the southern part of the continent can never present.

Among the Powers of Europe, jealousy and dissension have appeared over the question of pre-



PERSIA, AFGHANISTAN, BALUCHISTAN, and Parts of CENTRAL ASIA.

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dominance in Asia, and, as in Africa, certain spheres of influence have been marked out in which individual powers are allowed a free hand in their dealings with the natives. The danger of conflict between the European Powers arises when the boundaries of such spheres approach too near to each other, or perhaps intersect. The supremacy of England is, of course, recognized in India and Burma. Russia is predominant over all of northern Asia. Persia and Afghanistan are at present neutral ground, or rather the battle-places of Russian and British influence. French influence is supreme in Indo-China, and the power of the Dutch is predominant in the East Indies. Germany, which has been the last to enter the field, is an important factor in the Turkish provinces of Asia Minor, and by the seizure of Kiao-chau in 1897 gained a foothold in China. That Empire, also, although still intact, has effectually been partitioned into certain spheres, and the most interesting question of the future is whether these spheres of influences in China are destined to become provinces in fact, or whether one of the European Powers will prove strong enough to exercise for itself control over the entire enormous mass of the Middle Kingdom. The problem, then, that awaits solution is twofold. In the first place, it concerns the relations of the European Powers among themselves in regard to the distribution of the prize of political and commercial power in Asia. In the second place, it must deal with the task of the control of the Asiatic races by nations differing from them in race, religion, and civilization.

POLITICAL DIVISIONS OF ASIA. More than one-third of Asia is included in the Russian Empire, the dominions of the Czar (Siberia, Turkestan, Transcaucasia, etc.), embracing an area of about 6,500,000 square miles, with a population of about 25,000,000. About one-fourth of Asia is included in the Chinese Empire (China Proper, Manchuria, Mongolia, Tibet, East Turkestan, Sungaria), which has an area of over 4,000,000 square miles, with a population estimated at about 400,000,000. About one-tenth (India, Ceylon, Straits Settlements, Cyprus, Aden, etc.), is under the sway of England, whose subjects, including the inhabitants of the native States of India, number over 300,000,000. Independent Arabia embraces about five per cent. of the area of Asia. An area not greatly inferior to this is included in Asiatic Turkey, which comprises Asia Minor, Armenia, Kurdistan, Mesopotamia, Syria, and the Arabian territories of Hedjaz and Yemen. The subjects of the Sultan number between 15,000,000 and 20,000,000. Persia has an area about equal to that of Asiatic Turkey, and its population is supposed to be not far from 10,000,000. French Indo-China (Annam, Tongking, Cambodia, Cochin China, etc.) embraces about 250,000 square miles, the population being in the neighborhood of 15,000,000. The area of Siam is nearly equal to that of Indo-China, but it is only half as densely peopled. Afghanistan has an area of about 200,000 square miles, with a population estimated at about 5,000,000. The dominions of Japan (including Formosa) embrace about 160,000 square miles and a population not far from 50,000,000. Beluchistan embraces a very thinly peopled area equal to about half that of Afghanistan. Korea is about half as extensive as the Japanese Empire, covering about 80,000 square miles, and its population is about one-fifth that of the latter. The thinly peopled State of Oman, in Arabia, is about as large as Korea. In the Himalayan region are the independent States of Nepal and Bhutan, and in the Malay Peninsula there are several States under British protection. Portugal and France have small possessions in India, and Portugal, England, Germany, and Russia have establishments on the coast of China. The great archipelago which lies to the southeast of the Asiatic continent belongs mainly to the Netherlands, the other possessors in the order of the extent of territory possessed being the United States, Great Britain, and Portugal.

See articles on the separate geographic regions of Asia, and on its rivers and mountains. See also DISTRIBUTION OF ANIMALS; GEOGRAPHY; MOUNTAIN.

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ASIA, CENTRAL. A designation applied in a broad sense to a territory comprising about one-third of the Asiatic continent and embracing most of the thinly inhabited or uninhabited portions of the Chinese Empire, together with Russian Turkestan (with Bokhara and Khiva) and the highland of Iran (Northern Persia and Afghanistan). The eastern half, or Central Asia within the Chinese Empire, lies between the Altai Mountains on the north and the Tibetan Plateau on the south, and includes the vast Han-hai Steppe, with the desert of Gobi. The main divisions of this part of Central Asia are Mongolia and East Turkestan. In Russian official language, Central Asia is an administrative division of the Empire lying to the southwest of Siberia, and comprising, with part of what was formerly called Siberia, the recent Russian annexations in Turkestan. Russian Central Asia is divided into the provinces of Akmolinsk, Semipalatinsk, Turgai, Uralsk, Semirietchensk, Syr-Daria, Samarkand, Ferghana, and the Trans-Caspian territory. The total area is about 1,350,000 square miles, and the population, according to the census of 1897, was 7,721,684. Consult: Bonvalot, *Through the Heart of Asia* (London, 1889); Moser, *L'Irrigation en Asie Centrale* (Paris, 1894); Hedin, *Through Asia* (New York, 1899); Phibbs, *Central Asia* (London, 1899).

ASIA IN THE BIBLE. The name Asia is not met with in the Old Testament, but occurs several times in the Apocrypha, where it is used as a general term to indicate the territory ruled over by the Seleucidæ; i.e. the Tigris-Euphrates Valley, eastern Asia Minor, Syria, Phœnicia, and Palestine. This was in harmony with Greek usage, according to which the term meant much the same as it does to-day. The Romans, however, used the word in a more restricted sense to indicate the Province of Asia, which was constituted about B.C. 133, and in New Testament times included all Asia Minor west of Bithynia, Galatia, Lycaonia, and Lycia. In the New Testament the word is used in its Roman sense. The chief city of the province was Ephesus, where Paul labored for upward of three years, with the result that the whole province became permeated with the truth of the Gospel. Here were located the seven churches to which John addressed the message of the Apocalypse. See CHURCHES OF ASIA, THE SEVEN.

ASIA MI'NOR (Lat.). The ancient name of what is now called Anatolia (q.v.). It was divided into Pontus, Paphlagonia, Bithynia, Mysia, Lydia, Caria, Lycia, Pisidia, Pamphylia, Isauria, Cilicia, Cappadocia, Galatia, Phrygia, and Lycaonia. Along the western coast were Troas, Æolis, Ionia, and Doris (in Caria), the last three a series of Greek colonies. Greek colonies were also numerous along the north coast, on the shores of the Hellespont, Propontis, Bosporus, and Euxine. In the Seventh Century B.C. the Lydian Kingdom was the ruling power; but in the Sixth Century Asia passed under Persian rule. After the death of Alexander the Great, Asia was portioned out among his generals, finally falling partly to the Seleucidæ and partly to the Kingdom of Pergamum, which developed on the west coast. Under the Roman Emperors Asia Minor was generally prosperous, but suffered severely during the wars of the Byzantine Empire, and has not recovered under Turkish rule. Consult Ramsay, *Historical Geography of Asia Minor* (London, 1890).

ASIARCH, ā'shĭ-ärk (Gk. *'Ασιάρχης*, *Asiarchēs*, from *'Ασία*, *Asia* + *ἄρχειν*, *archein*, to govern). The title of an officer of high rank in the Roman Province of Asia, similar to officers in other provinces called after their respective provincial names, Galatarch, Lykiarch, Pamphyliarch. The appointment, functions, and tenure of office belonging to this position cannot be accurately ascertained. It is clear, however, that his duties were provincial and not municipal; that the proconsul of the province took some part in his appointment: that the title was retained after the term of service was ended; that he presided over the assembly (*Commune Asiæ*) which convened annually for the worship of Rome and the Emperor and the celebration of festivals in honor of the Imperial reign; and that, in so far as this worship involved the service of the temples dedicated to the Imperial house, the presidency over the assembly most probably merged into itself the high-priesthood over these temples, making the Asiarch thus a politico-religious officer, and confining the office itself necessarily to the wealthy and highly influential among the citizens. As these high priests were, in all likelihood, presided over by a chief priest, it is quite possible that the Asiarchate became a multiple office presided over by a chief Asiarch, forming thus an executive council connected with the annual assembly. From all this we may assume that it was on the occasion of one of these annual gatherings, held at Ephesus, that the uproar occurred in the theatre which impelled Paul's friends among these influential officers to caution him for his safety. (Acts xix. 31: "Certain of the Asiarchs, being his friends, sent unto him and besought him not to adventure himself into the theatre.") Consult: Mommsen, *Provinces of the Roman Empire* (English translation, London, 1895); Ramsay, *Cities and Bishoprics of Phrygia*, 2 vols. (London, 1895-97).

ASIATIC (ā'shĭ-ăt'ĭk) **BROTH'ERS.** A secret society, with aims similar to those of the Rosicrucians, which was formed in 1780 in Austria, and thence extended over all Germany.

ASIATIC SOCI'ETIES. Associations for the study of the languages, antiquities, and history of the Eastern continent. The first was founded by the Dutch in 1780. In 1784 the Royal Asiatic Society of Bengal was formed. A French society was organized at Paris in 1822, and the Royal Asiatic Society of Great Britain and Ireland in 1823. An American society (see ORIENTAL SOCIETY, AMERICAN) was formed in 1842, a German society in 1845, and an Italian society in 1887.

ASIMINA, ȧ-sĭm'ĭ-nȧ *or* ăs'ĭ-mī̇nȧ. See PAPAW.

ASK, äsk ('Ash Tree'). The name in Norse mythology of the first man created by the gods. See also Embla.

AS'KALON. See Ashkelon.

ASKEW, ăs'kû, or Ascough, Anne (1521-46). An English Protestant zealot and martyr. She was born at Stallingborough, Lincolnshire. She was of gentle birth, and against her will was made to supply the place of a deceased elder sister, as wife of Thomas Kyme, by whom she had two children. She was highly educated and devoted to biblical study. Because she had offended the priests, her husband, a stanch Roman Catholic, put her out of his house, which she willingly left. She went to London, it is supposed, to sue for a separation, but was arrested on a charge of heresy in March, 1545. Examined by the Bishop of London and others on the doctrine of transubstantiation, she denied its truth. She was imprisoned, but released on bail and acquitted on June 13. Again she antagonized her persecutors by the steadfast profession of her faith, and was rearrested in June, 1546, tortured by the rack, and finally burned at the stake in Smithfield, July 16, 1546. Consult: J. Bale, *The Lattre Examinacyon of Anne Askew, etc.* (Marburg, 1547); M. Webb, *An Account of Anne Askew* (London, 1865).

ASKHABAD, äs'kȧ-bäd' (Ar. and Pers. *askh*, love + *abad*, dwelling, town). A town of Russian Turkestan, the political centre of the Trans-Caspian territory, situated on the Trans-Caspian Railway, 290 miles southeast of Mikhailovsk, the seaward terminus of the railway (Map: Asia Central, G 2). It is a thriving town, owing its prosperity to its position near the Persian frontier, which has made of it a commercial entrepôt for goods exchanged between Russia, Persia, Khiva, Bokhara, and Turkestan. It has a garrison of 4000 soldiers. Population, in 1897, about 20,000.

ASKJA, äsk'yȧ. The largest volcano of Iceland, situated in the centre of the island, in about latitude 65° N. and longitude 16° 45′ W. (Map: Denmark, G 1). It has a crater over 700 feet deep, and is still active. Its last eruption took place in 1875, and traces of it are found in the large pumice-covered tract on the northeastern slope of the mountain.

ASLAUGA'S, ȧ-slou'gaz, **KNIGHT.** A German story by Fouqué (1814), translated by Carlyle in *German Romances.*

ASMAI, äs-mī', or **ASMAYI** (Abu Saïd Abd-el-Melek ibn Koraïb El-Asmaí) (c.740-830 b.c.). The preceptor of Harun-al-Rashid, and an important representative of Arabic literature. Sir Henry Rawlinson calls Asmai's history of the kings of Persia and Arabia previous to Islam, "perhaps the most valuable and authentic historic volume in the whole range of Arabian literature." His romance of *Antar* has been called "the Iliad of the desert." Several of his pupils became celebrated.

ASMANNSHAUSEN, äs'mäns-hou'zen. See Assmannshausen.

AS'MODE'US (Heb. *ashmedai*, probably from *shamad*, to destroy). Asmodeus figures largely in later Hebrew tradition, where he appears as the chief of the demons, just as Lilith was their queen (Talmud Babli, Erubin 100b). In Tobit (iii. 8, 17) he appears simply as an evil spirit possessed of great lust. It is probable that Asmodeus is the same as *Æshma*, or *Æshma dæva*; i.e. the 'covetous' demon who plays a prominent rôle in Mazdaism, the religion of Persia. In the Book of Tobit, both have the same quality of lust and the same power of killing any one standing in their way. In the Book of Tobit, Asmodeus is represented as having loved Sarah, the daughter of Raguel, and slain seven men in succession who were married to Sarah. When, however, Tobias came with the intention of marrying Sarah, he succeeded, with the help of his companion Raphael, in exorcising the demon by fumigating the heart and liver of a fish. Flying to Upper Egypt, the demon was pursued by Raphael, and bound, so that the couple henceforth had peace (Tobit, vi. 14, vii. 2). In Talmudic legends, Asmodeus is brought into association with Solomon, and while aiding him on certain occasions, notably in building the temple, he is regarded also as the cause of the offenses which history attaches to Solomon.

AS'MONE'ANS. An influential family of the Jews which attained prominence under the leadership of Judas Maccabæus. See Jews.

ASNIÈRES, ȧs'nyâr'. A northern suburb of Paris, France, 3 miles distant, on the left bank of the Seine. It is the chief town of its canton, an important railway junction, has domestic industries, and is a favorite summer pleasure resort of the Parisians. Population, in 1897, 24,317.

ASNYK, äs'nēk, Adam (1838-97). A Polish poet and dramatist, born at Kalisch. He studied medicine at Warsaw and Breslau, but finally turned to philosophy and took his degree at Heidelberg in 1866. During several years he was a political exile for participation in the insurrection of 1863, and about that time he began to publish poetry. He resided at Cracow from 1870 till his death. Several volumes of his 'poetical' work appeared under the pseudonym of 'El—y,' and have given their author a high place in Polish lyrical literature. As a dramatic writer, he produced, among other successful pieces, *Cola Rienzi; The Jew; The Friends of Job*, and a tragedy dealing with Lithuanian history, called *Kiejstut.*

ASOKA, ȧ-sō'kȧ, written also **ACOKA,** ä-shō'kä, **ASHOKA.** A renowned king of early India, famous as the patron of Buddhism, to which he stands in a similar relation to that of Constantine to Christianity. His full name was Asoka Vardhana. He was the son of Bindusāra Amitraghāta, of the Maurya line, and he ascended the throne of Magadha (modern Behar) about b.c. 272, as inheritor of the northern empire which his famous grandfather, Chandragupta, or Sandrocottus (q.v.), the contemporary of Alexander the Great, had founded. Through conquest he extended his power by bringing the kingdoms of Bengal and Orissa into his vast domain. At first he seems to have been of a cruel and savage nature, as shown by his causing his own brothers to be assassinated when he succeeded to the crown; but he appears to have experienced a change of heart or to have undergone a transformation when he was converted from Brahmanism to Buddhism. He devoted himself zealously to spreading the faith of the Buddha, convoking great Buddhist councils and making Buddhism the State religion of his extensive realm. The numerous edicts which he caused to be inscribed upon rocks and pillars in various parts of India bear witness to his religious devotion and show his loving care for animals, as well as for man; and they entitle him to the proud name, 'Beloved of the Gods,' by which he designates himself. They also shed much light upon the wisdom and justice of his administration, and upon the condition of India at the time when he reigned. One column, which was discovered as recently as 1896, is especially interesting, because we learn from it that he had caused it to be erected upon the spot where, according to tradition, the Buddha was born. Asoka died about B.C. 231. Consult V. A. Smith, *Aśoka, the Buddhist Emperor of India* (London, 1901); E. Senart, *Les inscriptions de Piyadasi* (Paris, 1881-86).

AS'OLAN'DO: FAN'CIES AND FACTS. A volume of poems by Robert Browning, published on the day of his death, December 12, 1889.

ASO'PUS (Gk. *'Ασωπός, Asōpos*). The god of the river Asopus. By Metope, daughter of the river-god Ladon, he had numerous daughters, through whom he became the ancestor of many of the heroes of Greece. When his daughter Ægina was carried away by Zeus, Asopus pursued, but was slain by a thunderbolt.

ASO'TUS. A character in Jonson's *Cynthia's Revels;* a hanger-on of Amorphus, whom he slavishly imitates.

ASP. The name applied in Europe to the *Vipera aspis*, a venomous serpent distributed all over southern Europe and the Alps region. It is the only poisonous snake that is found as far north as Sweden. The word *bethen* of the Bible, usually translated 'asp,' and the *aspis* of the Greeks (*ἀσπίς*) and the Romans, probably referred to several venomous snakes; at any rate, several poisonous serpents are found in Palestine and Egypt; but in some cases the biblical context seems to show that the much-dreaded cobra (*Naja haje*) of Egypt and Cyprus is referred to. This serpent is represented in the hieroglyphics of ancient Egypt, and is the snake which, after the poison-fangs have been extracted, is used by modern Egyptian jugglers in their snake-dances. It has loose skin on the neck that can be dilated into a hood much like that of the cobra di capello of India, but it does not have the spectacled markings. (See COBRA.) The asp of Cleopatra fame was probably the small-horned viper (*Aspis hasselquistii*). Several other vipers are sometimes called asps, especially the South African puff-adder (q.v.).

ASPAR'AGINE, $C_1H\ (NH_2)\ CONH_2CH_2COOH$. A crystalline substance which exists ready formed in common asparagus and in many other plants. Chemically it is, as the structural formula shows, an amide of asparitic (amido-succinic) acid; like the amide of any other acid, it yields the acid itself when boiled with dilute mineral acids or with alkalis. Asparagine is readily obtained from the expressed juice of the young shoots of asparagus, young vetches, etc., which, after filtration and evaporation to a sirup, soon deposits it in crystalline form. These crystals dissolve freely in boiling water, the cooled solution having a mawkish and cooling taste. That asparagine plays an important part in the physiology of plants is obvious from its wide distribution. It occurs in plants as a product of decomposition of albuminoid substances.

ASPAR'AGUS (Gk. *ἀσπάραγος, asparagos*, or *ἀσφάραγος, aspharagos*). A genus of plants of the natural order *Liliaceæ*. The species of this genus are herbaceous or shrubby plants, natives chiefly of the south of Europe and of Africa. The most widely diffused species is the common asparagus (*Asparagus officinalis*), a native of Europe, which grows on the banks of rivers and on the seashore, in meadows and bushy places, especially in sandy soils, occurring in a few places in Great Britain, and is also in general cultivation as a garden vegetable; its young shoots, when they first sprout from the earth, form a much-esteemed article of food. These sprouts contain a peculiar crystalline substance called *asparagine* (q.v.). The thick and tender kinds of asparagus are most esteemed for the table. Asparagus has been much increased in size and considerably altered in general appearance by cultivation, being seldom more than a foot high in its wild state, and not much thicker than a goose-quill, whereas it has been obtained in gardens more than half an inch in diameter, with a stem 4 or 5 feet in height. Asparagus is grown from seed. When the plants are one year old, they are transplanted to rows, and set at distances varying from 1 to 2½ feet apart each way. The plant will grow on almost any soil, but gives the best results on deep, rich, sandy loams, with a south or east exposure. It requires heavy manuring each year if large yields are desired. Male plants are held to be more productive than female. The first sprouts may be gathered when the plants are three years old, but a full crop is not to be expected until the spring of the fourth year. Beds once established and cared for endure many years. The raising of asparagus for the market has become an important market-gardening industry near the larger cities of Europe and the United States. Asparagus is sometimes forced out of season. For this purpose mature roots may be placed under the greenhouse benches or in pits, cellars, or almost any place where there is sufficient heat. But little light is needed. The asparagus shoots thus obtained are formed from the reserve material already stored in the roots. Roots thus forced once are exhausted and are thrown away.

In the open field, forcing trenches are sometimes dug between the rows, and filled with fermenting manure. The trenches may also be heated with hot-water pipes and with loose steam. The latter method has proved very effective at the Missouri Agricultural Experiment Station. Another method of forcing is to place sashes over the plants. At the Cornell Experiment Station, in New York, a low house was built over the bed, the frame of which was made of steam-pipes. The top was covered with canvas. Asparagus plants forced in place by any of these methods recuperate after one or two years, when they may be again forced. The young shoots of several other species of asparagus are also eaten, as those of *Asparagus tenuifolius*, *Asparagus acutifolius*, and *Asparagus albus*, natives of the south of Europe; the last of which is much used in Spain and Portugal as a salad, in soups, and as a boiled vegetable. On the other hand, the sprouts of the bitter asparagus (*Asparagus scaber*), which is very similar to the common asparagus, are not edible, on account of their bitterness. There are a number of species of asparagus grown in greenhouses as ornamentals. See LILIACEÆ. see FLOWERS.

ASPARAGUS DISEASES. The principal disease to which this plant is subject is a rust caused by the fungus *Puccinia asparagi*. The disease has been known for several years in Europe, but did not appear in the United States to a threatening degree until 1897. The leaves and stems are attacked and become covered with red blotches. Varieties seem to differ in the degree of susceptibility to disease.

ASPARAGUS IN′SECTS. Cultivated asparagus is remarkably free from insect pests. It is, however, preyed upon by two small chrysomelid beetles (*Crioceris asparagi*, and *Crioceris duodecim-punctata*), the former introduced from Europe to Long Island, N. Y., about 1856, and the latter more lately. The common one is nearly half an inch long. "The head is black, the prothorax reddish, often with two black spots above; the elytra are yellow, with a sutural (median) stripe of black, from which stripe extend two black bands dividing the yellow part of each elytron into three portions. . . . Beneath, the beetle is nearly or entirely shining black." These beetles, as adults, attack the young growing shoots, and as larvæ destroy shoots, berries, and seeds. The heads of the asparagus should be cut off, after the eggs are laid, and boiled. Wild asparagus in the neighborhood of the cultivated beds should also be looked after. Several other European beetles are more or less injurious to this plant; and our cucumber beetle (q.v.) is often pernicious in asparagus beds. The larvæ of several moths feed upon the plant, as do many species of plant-bugs and aphids, but none does persistent damage. Consult: The United States Department of Agriculture *Year-Book* (Washington, 1896), and *Report of United States Department of Agriculture, Bulletin No. 10* (Washington, 1898).

ASPARAGUS STONE. See APATITE.

ASPASIA, ăs-pā′shĭ-ȧ (Gk. Ἀσπασία) (c.440 B.C.). A celebrated woman of ancient Greece, noted for her genius, beauty, and political influence; daughter of Axiochus, and born at Miletus. The circumstances of her removal to Athens are unknown, but the beginning of her connection with Pericles dates from about B.C. 460. Pericles finally divorced his first wife by her own consent, and married Aspasia, by whom he had a son, also called Pericles. The real status of Aspasia in Athenian society has been a subject of much difference of opinion. The fact that at Athens marriage with any woman of foreign birth was held to be incomplete, and the offspring of such a union illegitimate, may have contributed to the notion that Aspasia was a courtesan. She was without doubt a woman of intelligence and wit; and this fact, combined with her freedom from the restraints which regularly confined the activity of women at Athens, naturally gave her prominence, and brought upon her not a little obloquy. After her marriage with Pericles, her house became the rendezvous of men of learning and distinction. The comic writers found her a convenient butt for their satire. Pericles is said to have been greatly influenced by her, but we can hardly consider as serious the charge that she was the cause of the Samian and Peloponnesian wars. On one occasion the comic poet, Hermippus, charged Aspasia with impiety, but she was successfully defended by Pericles himself. When the two sons of Pericles by his first marriage died, Pericles obtained from the State the rights of full citizenship for his son by Aspasia. After the death of Pericles, Aspasia married a sheep-owner, with whom she lived but a single year, and by whom she had one son. Her further career is unknown, but she continued to live at Athens, and died there.

ASPASIA, or **ASPATIA**. The heroine in Beaumont and Fletcher's *Maid's Tragedy*, whom Amintor makes love to, and then deserts.

ASPASIA, THE YOUNGER. A Phocean at first called Milto. She became the lawful wife of Cyrus the Younger, who named her Aspasia, after the wife of Pericles. Upon the death of Cyrus she was claimed by Artaxerxes, with whom she lived until he was succeeded by Darius. His son, Darius, then claimed Aspasia, according to the custom of the Persians, and Artaxerxes surrendered her to him, but soon after made her a priestess of Artemis at Ecbatana. In revenge Darius formed a plot to assassinate his father, but was detected and put to death.

AS′PECTS (Lat. *aspectus*, a sight, appearance; from *ad*, to + *spicere*, to look). In astronomy and astrology, certain positions of planets with respect to one another, as seen from the earth. In the days of astrology there were five aspects—conjunction, indicated by the symbol (☌), sextile (⚹), quartile (□), trine (△), opposition (☍). Two planets are in conjunction when they have the same longitude; the aspect is sextile when they are 60° apart; quartile, when the distance is 90°; trine, when it is 120°; and at 180° they are opposite to one another, or in opposition. Astrology ascribed to these aspects great influence over the fate of individuals and of nations. The only two of the terms now in use are *conjunction* and *opposition*.

ASPEITIA, äs′pä-ē′tyȧ. A town of Spain, in the Province of Guipúzcoa. It has some iron-works and mineral springs. About a mile from the town is situated the convent of Loyola, containing a library and museum, and the house in which Ignatius Loyola, the founder of the Society of Jesus, was born. Population, in 1887, 6616.

AS′PEN, or TREMULOUS POPLAR, *Populus tremula* (see POPLAR). A tree which grows plentifully in Europe and in Siberia. It is a native of Great Britain, and is frequent in Scotland, where it is found even at an elevation of 1500 feet above the sea. It has received the specific name *tremula*, from the readiness with which its leaves are thrown into a tremulous motion by the slightest breath of wind—a property for which, indeed, the aspen leaf has become proverbial. The leaves are nearly orbicular, but are broadly toothed, so as almost to exhibit angles. The footstalks are compressed, and in part to this compression is due the sensitiveness of the leaves to the breeze. The aspen grows quickly, with a straight stem, reaching to a height of from 50 to 80, or even 100 feet. In unfavorable situations it becomes dwarfish. The wood is soft, porous, light, white, and smooth; it does not make good fuel, but is very fit for the turning lathe, and especially for manufacture of troughs, trays, pails, etc. It is deemed excellent for arrows. If the stem is peeled and allowed to dry before it has been cut down, the wood becomes harder, and it may then be used as timber for the interior of houses. On this account the tree is of great importance in many districts, the more so as it succeeds in any soil, although it prefers one that is moist and gravelly. The bark contains considerable quantities of the glucoside called salicin. The charcoal made from the tree is sometimes used in the manufacture of gunpowder. *Populus tremuloides*, a similar species (according to some, a mere variety of the ordinary aspen), is a native of North America, and is called the American aspen. This is one of the widest-distributed trees of North America. It is found in Labrador and Alaska, and again as far south as Pennsylvania, Missouri, and even New Mexico. It lives in California also. Very similar also is another North American species, *Populus grandidentata*, which has a more restricted range. The wood of both these species is extensively used in the United States for the manufacture of wood pulp. *Populus grandidentata* has given rise to a number of forms with pendulous branches that are extensively grown as ornamentals. See also POPLARS.

AS′PEN. A city and the county-seat of Pitkin County, Colo., on the Colorado Midland, and Denver and Rio Grande railroads, 30 miles west of Leadville (Map: Colorado, D 2). Rich silver and lead mines are located here. Aspen was settled 1879-80, and incorporated in 1881. Its government is vested in a mayor, elected biennially, and a city council, composed of the mayor and 6 aldermen. Population, in 1890, 5108; in 1900, 3303.

AS′PER. A character meant to portray the author in Ben Jonson's *Every Man Out of His Humour.*

ASPERGILLUM. See WATERING-POT SHELL.

ASPERN, äs′pĕrn, or GROSS ASPERN. A village of Austria, on the left bank of the Danube, 5 miles east-northeast of Vienna. Population about 1400. This village and the neighboring one of Essling are celebrated as the scene of a sanguinary battle in the summer of 1809, between the French army, under Napoleon I., and the Austrians, under Archduke Charles. After the battle of Eckmühl (q.v.), in which the Austrians were defeated, the Archduke retired to the left bank of the Danube, leaving the road to Vienna open to the French. On May 12, 1809, the French army entered Vienna, when the Archduke concentrated his forces on the opposite bank of the river. Napoleon threw bridges over the river, from the island of Lobau, which he had occupied, and on the 21st the French army began crossing to the attack and seized Aspern and Essling. The Austrians at first seemed to give way; but when about half the French had crossed the river, they returned to the charge, and almost surrounded the enemy in the narrow plain between the two villages. Here ensued the battle of Aspern, a terrific conflict, the grand object of the contending hosts being the possession of the villages, of which Aspern was thrice lost and retaken by the Austrians. At the close of the day it remained undecided, but next morning it was renewed with fury on either side. The French had almost snatched the victory, when fresh Austrian troops marched on the field and saved the day. After terrible slaughter Napoleon ordered a retreat, and his shattered ranks retired to the little island of Lobau, in the middle of the river, whence they afterwards slowly withdrew to the right bank. The loss on the side of the Austrians was given at 4000 killed and 16,000 wounded; that of the French at double that number. Marshal Lannes, the most daring among the French generals, was among the slain. Both the villages were reduced to heaps of ruins. The French called this the battle of Essling, while the Austrians gave it the name of Aspern.

ASPER′ULA. See WOODRUFF.

AS′PHALT, or **ASPHAL′TUM** (Gk. Ἄσφαλτος, *-ον*, *asphaltos, -on*, a loan-word of uncertain origin). A bituminous substance of solid consistency occurring in nature and belonging to the same series of hydrocarbon compounds as petroleum and natural gas. It is also called Jews' pitch, Dead Sea bitumen, compact bitumen, and Trinidad bitumen. Asphalt probably owes its origin to vegetable matter which has been subjected to a slow process of decay, the hydrocarbon compounds having distilled off and settled in neighboring deposits. It is in fact produced artificially in the manufacture of coal-gas, in which process much tarry matter is evolved from the retort. If this tar be subjected to partial distillation, naphtha and other volatile matters escape, while artificial asphalt is left behind. Asphalt commonly has a pitchy odor, a black or dark-brown color, but does not soil the fingers; it is insoluble in water, sparingly soluble in alcohol, but is dissolved in greater part by ether, oil of turpentine, and naphtha. Its specific gravity ranges from 1 to 1.1, and it burns readily with a smoky flame. In nature, asphalt occurs in sheets or lakes, mixed with earth, as in Trinidad and Venezuela, or mixed with sand, or in sandstone, or in limestone (asphaltic or bituminous limestone), as is the case in Cuba, California, and Utah.

The largest natural deposit of asphalt is on the island of Trinidad, where the so-called Pitch Lake exists. This is a great basin-shaped deposit of asphalt, 18 feet deep near the margin, and 78 feet in the centre, and although solid in appearance, there is nevertheless a continual but almost imperceptible motion throughout the mass. The surface of the lake is 148 feet above sea-level, and from the edge several streams of asphalt have flowed down the slope toward the shore. Excavations made to a depth of 20 feet have filled up again in 6 months. While the asphalt is solid enough to drive a wagon and team across it, still the slow movement of the material tends to draw in the tracks laid out to the pits, unless properly supported. Another asphalt lake occurs in Venezuela, and the product is known as Bermudez asphalt. It is a swampy tract of about 1000 acres, in which there are numerous pitch pools supplied by springs. Asphalt is also found on the shores of the Dead Sea in large quantity and is known to the Arabs by the name of Hajar mousa, or Moses's stone; while a fluid form occurring in California is known as maltha, or mineral tar. The occurrence of asphalt is not restricted to any one geological formation, but it is not known in the Archæan. The deposits of asphalt in the United States are insufficient to meet the demand, and large quantities are imported, chiefly from Trinidad and Venezuela.

The uses of asphalt are numerous. It is employed as an ingredient of varnish and also as an insulating material. Buildings and other objects are often coated with it, to protect them from dampness, and vessels are painted with asphalt to protect them from the *Teredo*, or ship-boring worm. Asphalt alone is not used for medicine, but its natural solution in naphtha —viz. petroleum—is of medicinal value, used either internally or externally. About 1840 asphalt became of importance as a material for paving, and for this purpose it was mixed with powdered rock when hot, and then spread on the surface to be paved. Asphalt pavements are smooth and clean, but less durable than stone, and in moist climates are often slippery.

Asphalt Mining, in the case of rock asphalt, is usually a simple process, in which blasting is employed to loosen the rock. In the Seyssel Mines, in France, the bituminous limestone is blasted from between layers of ordinary white limestone, and the work done for the most part underground. In the United States, the Kentucky bituminous sandstone and the bituminous limestone of Texas are worked from the surface, after stripping off the overlying material. The same general process seems to be employed elsewhere in the United States. In Santa Barbara County, Cal., a deposit of sand impregnated with bitumen is mined by first using a powerful hydraulic jet, supplied by a steam-pump and water-pipe. Some 6 to 8 feet of loam is thus washed into the ocean; and after a thin layer of clay is spaded off, the bituminous sand is then thrown into cable cars by men with hot spades, and hauled up an incline to the refinery. By far the most interesting and expensive asphalt mining and refining plant in the world is that which produces the California Aleatraz product, and which is also located in Santa Barbara County. The asphaltic sandstone is mined at Sisquac, by open-face blasting, and the rock loaded on to a cable car by means of an electric crane and hauled to crushing rolls. Its subsequent treatment to reduce it to a liquid condition for piping to the refining plant, 30 miles distant, is described below, under *Asphalt Refining*.

The lake asphalts of Trinidad and of Bermudez are mined in a simple but interesting manner. The Trinidad asphalt is dug by means of picks before daylight, when brittle. It is loaded into buckets, placed on flat cars which run on a cable railway extending out onto the asphalt deposit. This railway is supported on palm branches, to prevent its settling into the asphalt, and at its shore end the buckets of asphalt are hoisted by hydraulic power and then conveyed on an aërial cableway to a pier 1700 feet in length, with its head in 30 feet of salt water. The contents of the buckets are dumped directly into the holds of vessels, and the empty buckets are sent back up to the lake as the heavy ones come down. The aërial cableway is about 3400 feet in length, half over the land and half over the water, and had in 1900 a capacity of 70 tons per hour. (See Cableway, for description of this method of transportation.) Adjoining the Trinidad lake-asphalt deposit is found the so-called land asphalt. This is described as an overflow from the lake, and is harder and more brittle than the lake product. It occurs in pockets and other isolated deposits, from which it is dug out, carted to the beach, placed on lighters, and conveyed to and loaded on ocean vessels.

At the Bermudez Lake the asphalt is excavated in practically the same way as at Trinidad; but it is loaded into hand-cars running on a portable track. On shore the cars are dumped into boxes placed on flat cars, which are hauled by a locomotive about 5 miles to a wharf on the Guanoco River. If a vessel is at hand, the asphalt is dumped directly into its hold; otherwise it is stored on shore. The Bermudez product is softer than that from Trinidad. It is so soft that the holds of the transports must be divided into compartments to prevent flowing to one side and giving the ships a permanent list. There is a small refining plant on the shore at the Trinidad Lake, and in 1900 one was being erected at the Bermudez shipping wharf. Most of the asphalt from these two sources is refined after ocean shipment.

Asphalt Refining and Working varies with both the natural product and the uses to which it is to be put. Generally speaking, the object of the process is to remove water and volatile and other foreign matter from the crude material; but for some purposes it is highly desirable to leave the mineral matter mixed with the asphalt. This is particularly true of asphalt that is to be used for paving and similar purposes, since for such uses the asphalt really serves merely as a cementing and waterproofing medium, the bulk of the paving material consisting of sand, or powdered limestone or sandstone. The rock asphalts, when used for pavements direct, are not refined; but are simply crushed, reduced to powder by heat, and then compressed in place, as described under Pavements. The crushing is done by means of rolls, or by toothed cylinders, and the heating is effected in revolving cylinders, at a temperature of some 300° F.

One of the simplest methods yet attempted for abstracting asphalt from the rock products is by boiling the rock in water. This is possible in the case of the lighter asphalts; for, with a specific gravity less than water, the asphalt will rise to the top of the kettle, whence it may readily be removed. Either calcium or sodium chloride (common salt) may be substituted for the water in the boiling kettles. The heat may be applied directly or indirectly, steam being used in the latter case. The asphalt thus separated must be refined by evaporation and sedimentation. Carbon bisulphide may be used as a solvent to extract asphalt from the rock, without the use of heat. This material, however, costs more than naphtha, the solvent most commonly applied, and a smaller proportion of it can be recovered. The same general process is followed in the case of the bisulphide as with naphtha, except for the absence of heat and the introduction of the solvent at the bottom instead of the top of the vessel.

The Aleatraz sandstone rock asphalt already described is treated as follows: The rock is dumped from the cars coming from the mines into a hopper, from which it passes through a succession of fluted crushing-rolls, each nearer together than the previous ones, the last set being three inches apart. From this crusher the fragments go to a steam-heated drum melter, which reduces the material to a mushy state. Next naphtha is added, dissolving the asphalt proper and leaving the sand below. The sand is treated a number of times, until the asphalt has been practically exhausted, after which the sand is wasted. The combined solution of naphtha and asphalt flows by gravity for 30 miles, through a 5-inch steel pipe-line, to Alcatraz Landing. Here the naphtha is recovered by distillation and pumped back to Sisquac to be used again. The asphalt left after the distillation is then barreled and shipped.

The California maltha already mentioned is refined as follows: The bituminous sand is thrown into a steam-jacketed cylinder with revolving arms, where it is broken into fragments. It is then placed in boiling water, whereupon the maltha floats to the top of the vat, the sand settles to the bottom, and is removed mechanically. The crude maltha is sent to a storage tank, then to a refining kettle, where the volatile matter is evaporated, the temperature being increased from 100 to 240° F. during the 24 hours of final treatment.

Asphalt is also produced in California by distilling crude petroleum oil, the heat being applied through steam-coils. The kettles are open at first, then closed, the temperature being increased during the process from 220° F. to 700° F.

Trinidad Lake asphalt is refined, or has its water and volatile matter driven off, by heating it in tanks about 10 feet square and 15 feet high. The heat is applied by means of steam-coils placed in the tanks. To keep the mineral matter from settling, jets of steam are passed into the bottom of each tank. The steam-pressure employed is about 100 pounds, giving about 325° F. At this temperature the asphalt is a liquid, so that after the water has been driven off the refined product can be run into barrels for shipment. In the older method of refining, the heat was applied by means of a fire, which was directly in contact with the vessel containing the asphalt. Aside from the danger of overheating, this process was objectionable because it required 6 to 7 days, instead of the 12 hours taken by the new process. In addition, the sedimentary matter settled to the bottom of the old tanks, and was lost; whereas it is now retained as a valuable component of the asphalt.

Aside from such of the rock asphalt as is used for paving, most of the asphalt of commerce is a refined product, or else the latter made into either asphaltic cement or mastic. *Asphaltic cement* is refined asphalt, tempered with residuum petroleum oil, maltha, or some other material, but generally the oil. From 15 to 18 pounds of oil is added to 100 pounds of refined asphalt, the amount of oil varying with the uses to which the cement is to be put. The two ingredients are mixed while hot, being agitated by mechanical means or by air. *Mastic* is prepared from crushed or powdered rock asphalts, and also from refined asphalt. Either asphaltic cement or maltha is used with the rock asphalt, and sand and perhaps powdered limestone with the asphaltic cement. The mixture is made under heat, and is run into molds for shipment. When used for floors, sidewalks, or roofs, the mastic blocks or cakes are melted, refined asphalt and sand or fine gravel are added in small quantities, until the desired consistency is attained. Powdered limestone may be used in place of gravel or sand, particularly where a hard, dense, impervious final product is desired. *Asphalt concrete* is simply crushed stone or gravel bound together with mastic, the two mixed hot and compressed after being put in place. Some of the most important uses to which asphalt is put are for pavements, pipe coatings, and reservoir linings. See PAVEMENTS; DAMS AND RESERVOIRS.

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ASPHAL'TIC COAL, or **ASPHAL'TITE.** Solid forms of asphalt, originally derived from petroleum, which, through loss of their oil content, have assumed an appearance analogous to that of glance-coal. Asphaltic coal occurs usually in fissures, into which it has flowed while in a liquid or viscous condition. Such fissure deposits have been found in rocks of Devonian, Carboniferous, and Tertiary Age, and the contained material has received various names in different portions of the country. The chief uses of these asphaltic coals are as bases for varnishes, as insulators, and formerly, to a large extent, as gas-enrichers. The more important varieties, with the localities where mined, are: Albertite, Albert County, N. B., Canada; gilsonite and uintahite, in the Uinta Mountains of Utah; grahamite, originally from Wood County, W. Va., but subsequently found in Colorado, Texas, and Mexico; wurtzilite, in Utah.

An allied substance is ozocerite, or mineral wax, obtained in Galicia (Austria) and in Utah. (See under special heads.) For descriptions of the various deposits and theories regarding the origin of the asphaltic coals, the reader is referred to the following papers: Bailey and Ells, "Report on the Lower Carboniferous Belt of Albert and Westmoreland Counties, New Brunswick," in *Geological Survey of Canada, Report of Progress, 1876-77* (Montreal, 1878); Peckham, "The Probable Origin of Albertite and Allied Minerals," *American Journal of Science*, Second Series, Vol. XLVIII. (New Haven, 1869); Lesley, "On an Asphaltic Coal Vein in West Virginia," *American Philosophical Society, Proceedings, 1865* (Philadelphia, 1865); Wurtz, "On Grahamite," *American Journal of Science*, Second Series, Vol. XLII; Blake, "Uintahite, Albertite, etc.," *Transactions of the American Institute of Mining Engineers*, Vol. XVIII. (New York, 1890); Eldridge, "The Uintahite (Gilsonite) Deposits of Utah," *Seventeenth Annual Report of the United States Geological Survey, Part I.* (Washington, 1896); Taff, "An Albertite-like Asphalt in the Choctaw Nation, Indian Territory," *American Journal of Science*, Vol. CLVIII. (New Haven, 1899).

AS'PHODEL (Gk. *ἀσφόδελος*, *asphodelos*, king's spear, asphodel), *Asphodelus*. A genus of plants which has by some botanists been made the type of a natural order Asphodeleæ, now, however, generally regarded as forming part of the order *Liliaceæ*. The roots of the asphodels are fleshy and thick. The species are not very numerous, and are mostly natives of the countries around the Mediterranean Sea. The Yellow Asphodel (*Asphodelus luteus*, or *Asphodeline lutea*, as it is perhaps more properly called) and the White Asphodel (*Asphodelus albus*) have long been known as garden flowers. The Yellow Asphodel has an unbranched stem 2 to 3 feet high, much covered by the sheathing bases of the long narrow leaves. The leaves of the White Asphodel are all radical, and its flowers are in branched clusters. Both species flower about the time when spring passes into summer. *Narthecium ossifragum*, abundant in the moors of England and elsewhere in Europe, is the well-known Bog Asphodel. In the United States, *Narthecium americanum* is known by the same name. False Asphodel is a name given to some of the species of *Tofeldia*. All these plants are rather closely related. The asphodel often referred to by poets is *Narcissus pseudonarcissus*. For illustration see ARAUCARIA.

ASPHYX'IA (Gk. *ἀσφυξία*, a stopping of the pulse, from *ἀ*, *a* negat. *σφύξις*, *sphyxis*, pulse). A condition brought about in oxygen-breathing animals when any obstacle prevents the entrance of air into the pulmonary vesicles, and unconsciousness or death occurs. Aquatic animals may be asphyxiated either by depriving the water they inhabit of oxygen, or impregnating it with noxious gases. Asphyxia may develop by sudden strangulation, or gradually, as in close rooms with insufficient oxygen. When sudden strangulation occurs, there are at first a few seconds of quiet; then respiratory movements, both inspiratory and expiratory, follow rapidly, until in about a minute there are powerful convulsive movements of the chest, mainly expiratory. Exhaustion thus takes place, and the movements of respiration slowly cease; the blood-pressure falls; the right side of the heart becomes engorged with blood, and unconsciousness takes place in two or three minutes. In the early stages the face becomes livid; later it becomes pale; the mucous membranes and skin become bluish, and the fine blood-vessels injected. Small hemorrhages may occur. The heart, which at first beats strongly, becomes weaker and weaker, and finally ceases to beat, and death occurs. In man, this occurs in from a minute and a half to five minutes. Some persons, no doubt, as the Ceylon divers, can by habit do without a fresh supply of air for a longer period; and some diving animals have an arrangement of blood-vessels by which they are enabled to be under water for a long time. In the treatment of asphyxia, the cause must be removed immediately, if possible.

Ordinary restorative measures may be employed with hopes of success at a very long period after apparent death. Some have recovered after being submerged in water for two hours. The object of all methods is to supply fresh air to the lungs and to force the blood from the engorged right side of the heart—in other words, to supply an artificial respiration and an artificial circulation. See RESPIRATION, ARTIFICIAL.

ASPHYX'IANTS (for derivation, see ASPHYXIA). When applied to particular munitions of war, the term refers to shells or other projectiles containing chemical substances designed to produce a suffocating or poisonous effect. The Chinese have, from the earliest times, availed themselves of this device, and in their 'stink-pot' secured such results. The use of asphyxiants has always been discouraged by the more enlightened authorities, both military and civil; so much so that The Hague Peace Conference of 1899 strongly condemned their employment. Lyddite shells were used by the British during the Anglo-Boer War of 1899-1902. These shells do not entirely come under the head of asphyxiants, but the results sought for in their employment are in many respects the same. They are designed to render untenable a larger area of ground than would be accomplished by the projectile itself. These shells in exploding give rise to fumes and smoke which serve the double purpose of enabling the gunners to locate the point where they strike and obscuring the sight of the forces among whom they fall. Their use, however, is generally condemned, and their especial destructiveness or effectiveness greatly questioned. Other compositions possible of employment are designed to burn fiercely, igniting whatever inflammable material they may come in contact with, such as the interior fittings of ships, forts, or other buildings.

AS'PIC (Fr., probably from *aspic*, an asp, alluding to its coolness). A savory meat jelly molded into a regular form, and containing portions of fowl, game, fish, and the like, usually with hard-boiled eggs and sliced pickles.

AS'PINWALL. See COLÓN.

ASPINWALL, WILLIAM (1743-1823). An American physician, born at Brookline, Mass. He received his education at Harvard, and studied medicine in Philadelphia. He acted as a surgeon in the Revolutionary Army, and subsequently practiced his profession at Brookline. He is remembered for having introduced vaccination in this country.

ASPINWALL, WILLIAM H. (1807-75). An American railroad builder. He was born in New York City, and as early as 1837 was a partner in the firm of Howland & Aspinwall, then one of the largest shipping firms in New York. In 1850 he retired from the firm, and devoted his entire attention to building the Panama Railroad, the eastern terminus of which was named after him. He was also active in the formation of the Pacific Mail Steamship Company.

AS'PIRATE (Lat. *aspiratus*, breathed upon). The term is applied by philologists to certain sounds, especially in Sanskrit and Greek, such as *kh*, *gh*, *θ* (th), *φ* (ph), accompanied by a breathing. The term may also include the English consonants *c*, *t*, *p*, when followed by an accented vowel. Its application to the sounds *ch* and *h* is popular, and is not recognized by specialists. See PHONETICS.

AS′PIRA′TOR (Lat. *ad*, to + *spirare*, to breathe). An apparatus used to draw air or other gases through bottles or similar vessels, which finds extensive use in the examination of gases by chemists. The simplest form consists of a tight vessel filled with water, with a stopcock connected with the upper end, and a second stopcock at the lower end. By opening these two stopcocks, the suction produced by the passage of the water out of the lower opening draws the gas into the receptacle. Various forms of apparatus based on this principle are used for industrial purposes.

ASPÍROZ, äs-pē′rōth, Manuel de (1836—). A Mexican statesman and diplomat. He was born at Puebla, and graduated in 1855 at the University of Mexico. He fought in the war against the French, and in 1867 was appointed Assistant Secretary of State for Foreign Affairs in the newly established republic. From 1873 to 1875 he was Mexican consul at San Francisco, and in 1875 was elected to the Senate. He was a professor of law in the College of Puebla from 1883 to 1890; again became Assistant Secretary of State for Foreign Affairs in 1890; and in 1899 succeeded Señor Romero as Mexican Ambassador to the United States. His works include *Código de extranjería de los Estados-Unidos Mexicanos* (1876) and *La libertad civil como base del derecho internacional privado* (1896).

ASPLE′NIUM (Gk. ἀσπλήνον, *asplēnon*, spleenwort, from ἀ, *a* euphonic + σπλήν, *splēn*, spleen). A genus of ferns, of the order or sub-order Polypodiaceæ. The species are numerous, there being about 200, widely diffused both in the Northern and Southern hemispheres. Many of them are of great beauty; and the small size of some recommends them to cultivators of ferns who find themselves much limited as to space. The species of this genus may be readily recognized by their free veins and their elongated sori, which are covered by the indusium. Some of the species bear the English name Spleenwort, as *Asplenium trichomanes*, *viride*, *adiantum-nigrum*, etc., having been formerly supposed efficacious in removing obstructions of the viscera. They have now fallen completely into disuse, but were at one time very much employed, principally in the form of sirupy decoctions. Some of them, as *Asplenium trichomanes* and *Asplenium adiantum-nigrum*, are frequently called Maidenhair. At least a dozen species are met with in the eastern United States, of which the tall-growing ones, 1 to 4 feet high, *Asplenium filix-fœmina*, *Asplenium angustifolium*, and *Asplenium thelypteroides* are the best known. They are often cultivated, especially the first named, of which there are said to be at least half a hundred varieties. The genus *Asplenium* has had a long life-period upon the earth, it having appeared first during Middle Jurassic time, since which period it has spread over the entire land surface of the globe.

ASPRAMONTE, äs′prä-mōn′tå. An Italian epic poem founded on the traditional defeat of the Saracens by Charlemagne near a place called in the legend Asparamonte. Its author is unknown, but it was published in 1516, at Milan, a year after *Orlando Furioso*.

ASPROMONTE, äs′prō-mōn′tå (It., 'steep mount'). A mountain near Reggio, in Southwestern Italy (Map: Italy, K 9). It rises 6365 feet above the sea, and is famous on account of the defeat and capture of Garibaldi by the forces of Victor Emmanuel, August 29, 1862, which took place near it.

ASPROPOTAMO, äs′prō-pŏt′ȧ-mō. See Achelous.

AS′QUITH, Herbert Henry (1852—). An English statesman, born at Morley, Yorkshire. He was educated at the City of London School and at Balliol College, Oxford. His college training prepared him especially for the practice of law, and he was admitted at Lincoln's Inn in 1876, and four years afterwards became a queen's counsel. His political career began in 1886, when he was elected to Parliament for East Fife, by which district he was reëlected in 1892 and in 1895. It was his introduction of the amendment to the Queen's speech in August, 1892, that led to the dissolution of Lord Salisbury's Government, and he became Home Secretary in Mr. Gladstone's Cabinet which followed. He served on the Ecclesiastical Commission until 1895. His activity and effectiveness during the Home Rule debates made him the most conspicuous figure in the House. The position he assumed during the labor troubles of 1893 won the confidence of Parliament, and led to his appointment as an arbitrator of the strike of the London cabmen in 1894, a difficult office which he discharged by an award that was satisfactory to both sides. He drew up the bill providing for the disestablishment of the Church of Wales introduced in 1894, and supported that measure until it was rejected by the House. Although technically a Liberal, and usually a thoroughgoing supporter of that party's policies, Mr. Asquith declared in a public speech in London, on June 20, 1901, that he and the branch of the party he represented favored the Government's policy in the Boer War; and he contended that this attitude did not justify an attack upon his party loyalty.

ASS (A. S. *assa*, Goth. *asilus*, Rus. *oslŭ*, Lat. *asinus*, probably of Eastern origin; cf. Heb. *ăthōn*, she-ass) or Donkey, when domesticated. A member of the family Equidæ, and genus Equus, of horses, zebras, etc. Two species are recognized by Blanford and other specialists —one Asiatic and the other African. Asses resemble zebras rather than horses, in their less size, the presence of callosities on the forelegs alone, and the shortness of the hairs of the mane and tail, the latter (rather long) bearing mainly a terminal tuft. They differ from the zebras in color, in not having stripes (except as hereafter mentioned) and in having somewhat longer ears—but never so long as in the donkey. Both species roam desert regions in small bands, and are extremely hardy, agile, and swift. Their colors are pale, harmonizing with their surroundings, and their voices are between the neighing of the horse and the braying of a donkey. Both are killed for food, and occasionally captured, but are intractable.

Asiatic Ass. The Asiatic ass (*Equus hemionus*) is distributed over all the arid interior of Asia, from Syria to eastern Mongolia and northern India, although more restricted now than formerly by the encroachments of civilization. It was well known to the ancients, who called it *onager, hemionus*, etc., to which more recent writers have added confusing native names. There appear to be three local varieties of this wild ass. One is the kiang, koulan, or dziggettai, of Tibet and Mongolia, which is the largest, reaching 4 feet in height at the shoulders. It is dark-reddish in color, and has a narrow black stripe from (and including) the mane along the spine to the top of the tail; it inhabits mountains up to the snow-line. The second is the ghorkhar, or onager, frequenting the plains of northwestern India, Afghanistan, and Beluchistan, which is smaller and paler, sometimes silvery white, and has a comparatively broad dorsal stripe. The third variety, less well marked, is that of Persia and Syria. All are white underneath, and are likely to show obscure bars on the lower legs. This last-named variety, no doubt, is that known to the writers of the Old Testament, who use it as a type of wildness and freedom—"Whose house I have made the wilderness, and the barren land his dwellings. . . . The range of the mountains is his pasture" (Job xxxix, 6, 7, 8). It is, indeed, one of the freest, most agile, and perhaps the swiftest of wild quadrupeds. The kiang will rush over broken, rocky ground in an astonishing manner, and those of the plains are beyond the power of a single horseman to overtake. "In the Bakanir Desert the foals are captured during the summer by parties of mounted Baluchis, who, by relieving one another, hunt them till they fall from sheer exhaustion, when they are taken and bound." These foals bring high prices in India, but are kept more as curiosities than for service. Another plan is to lie in wait at night by a drinking-place, and then run the animals down when heavy with water; but their keen scent and wariness make this difficult. Among the Persians, the pursuit of asses with greyhounds is a favorite sport, and their flesh is esteemed by many and said to resemble venison. The kiangs of the mountainous wilderness of Tibet are less shy, and will often approach one closely, with manifest curiosity, and even mingle with the horses of a train, or enter the camp. "The food of these wild asses," says Lydekker, "consists in the lowlands of different kinds of grasses, which are frequently dry; but in Tibet it is chiefly composed of various woody plants, which form the main vegetation of these arid regions. In the hills to the west of the Indus these animals are to be found wandering pretty well throughout the year; but in the early summer, when the grass and the water in the pools have dried up from the hot winds, the greater number, if not all, of the ghorkars migrate to the hills for grass and water."

African Ass. The African wild ass (*Equus asinus*) is very distinct. It is larger than the Asiatic species, reaching 4 feet 8 inches, or 14 hands, in height, and in color is always bluish or else creamy, with no tinge of red; the muzzle, throat, and belly are white; and a dark stripe extends from the shoulders along the spine to the tail, and also down the withers, while the legs are barred; but the last two markings vary greatly. The ears are very long, and the mane and tail-hairs are comparatively short and indistinct in color. This species ranges throughout the open regions of northeastern Africa, from Somaliland to the Red Sea, and westward throughout the Desert, where its food and habits are much like those of the ghorkhar, except that its small troops do not congregate into herds. Sir Samuel Baker describes them in western Abyssinia as follows:

"Those who have seen donkeys in their civilized state have no conception of the wild and original animal. Far from the passive and subdued appearance of the English ass, the animal in its native desert is the perfection of activity and courage; there is a high-bred tone in the deportment, a high-actioned step when it trots freely over the rocks and sand with the speed of a horse. When it gallops freely over the boundless desert, no animal is more difficult to approach; and although they are frequently captured by the Arabs, those taken are invariably the foals, which are run down by fast dromedaries, while the mothers escape."

The Donkey. The domestic ass is undoubtedly, in its origin, the tamed African species. Its prevailing color is gray, varying to pure white or full black, and with the shoulder stripes and leg-bars more or less preserved. It was known in Egypt long before the horse, and probably was first domesticated in that region, where it is still a favorite animal, not only for riding, but for its milk; nevertheless, it is said to have been hated and abused by the ancient Egyptians in their flourishing period, and the prejudice against it was carried among the Romans. From Judges iv. 10 we learn that at a very early period the great were accustomed to ride upon white asses, and a preference is given to white asses in the East to this day. Fine large breeds exist in Syria and Turkey now. In Europe, choice breeds are to be found in Italy, Malta, and especially in Spain. The animal seems not to have come into general use in Great Britain until after the time of Elizabeth, and now is chiefly employed there by pedlars and the poor, or for children's carriages. Its price is scarcely one-twentieth that of a good horse, and it can be kept at one-fourth of the expense, delighting in the coarse herbage which other animals reject, and satisfied with comparatively scanty fare. The obstinacy ascribed to the ass seems to be very generally the result of ill treatment; and proverbial as it has become for stupidity, it is probably quite equal in intelligence to the horse. It was early brought to America, and the finest donkeys in the world are now said to be those in the United States, where some 60,000 are owned upon farms, chiefly in the Southern Central States, and used for the propagation of mules and hinnies (see Mule), the useful hybrids between the ass and the horse. Consult: V. Hehn, *Wanderings of Plants and Animals*, English translation by Stallybrass (London, 1891).

The milk of the ass contains more sugar of milk and less caseine than that of the cow, and is therefore recommended as a nutritious diet in cases of weak digestion. Its usefulness in cases of consumption has long been known, and it was often prescribed as a kind of specific when that disease was treated on principles very different from those which regulate its treatment now. In some parts of the Sudan, large herds of she-asses are kept for milking alone.

The leather called shagreen (q.v.) is made by a peculiar process from the skin of the ass, which also affords excellent leather for shoes and the best material for drums. The bones of the ass, which are very solid, were used by the ancients for making flutes. See colored plate of Horses, and Plate of Equidæ.

ASS, Feast of the. A burlesque ceremony highly popular in northern France during the Middle Ages. It was of the nature of a parody on the service of the Church, but seems to have been instituted in good faith and without any intentional irreverence. It degenerated, however, into scurrilous indecency, and was prohibited by the ecclesiastical authorities in the Fifteenth Century. It was variously celebrated in different places; thus, e.g. at Rouen it occurred shortly before Christmas, and consisted in the representation of a little farce, in the principal scene of which Balaam's ass appeared before the altar of the cathedral and uttered a prophecy of the early coming of Christ. See Abbot of Joy.

ASSAB, âs-säb′, or Saba, sä′bȧ. An inlet of the Red Sea, on the African coast, near Bab-el-Mandeb (Map: Africa, J 3). It is about 16 miles long by 5 miles wide, and about 50 feet deep at Busna, the main anchoring-place. Together with two small islands in front of it, Assab was ceded to the Italian Government, in 1881, by an Italian steamship company, which had acquired it in 1869. The town of Assab is situated at the entrance to the bay, and has a population of 500.

ASSAI, âs-sī′ (from the native Brazilian name of the palm-tree). A beverage much used at Pará and other places on the Amazon. It is prepared from the fruit of certain species of palm nearly allied to the cabbage palm of the West Indies. (See Areca; and Cabbage Palm.) The assai palms are remarkably slender trees, the most common species (*Euterpe edulis*) rising to the height of 60 or 80 feet, with a smooth stem only about 4 inches in diameter. The fruit is small, but is produced in great quantity upon branched spadices, which are thrown out horizontally beneath the crown of leaves. It consists of a hard seed, with a very thin covering of a firm pulp or flesh. The tree grows in swamps flooded by the high tides. Warm water is poured upon the fruit: and by rubbing and kneading, a liquid is procured, consisting simply of the pulp of the fruit and water, which is constantly sold in the streets of Pará, and of which the inhabitants are extremely fond. This is assai. It is a thick, creamy liquid, of a purplish color, and a flavor like that of a freshly gathered nut. It is commonly used with the bread made from Manioc (q.v.), called farina, and either with or without sugar. The stem of the assai palm is sometimes used for poles and rafters, and its terminal bud as a cabbage or as a salad with oil and vinegar; but it is too much valued upon account of its fruit to be often cut down for these purposes. Another species, *Euterpe catinga*, is found in forests of a dry, sandy soil and very peculiar vegetation, known as catinga forests. The beverage made from it is sweeter than the common kind, but the product of the tree is much smaller.

ASSAL, äs-säl′. An important salt-lake in the east of Africa, near the head of the Bay of Tajura. It is over 8 miles in length, and 4 miles broad, and its surface is over 530 feet below the sea-level. Its shores are covered with salt, which is exported in considerable quantities to Abyssinia.

ASSAM′. A chief commissionship in the north-eastern part of British India, bordering on China, Burma, Manipur, and Bengal (Map: Burma, A 1). Area, 52,078 square miles. The interior belongs chiefly to the valley of the Brahmaputra, while the territory on both sides of the river is mostly mountainous. Among the mountain districts are the Garo, Khasi, and Jaintia Hills. The streams are abundant and the lower lands frequently suffer inundations. The climate is moderate as regards temperature. The annual rainfall in some sections is the heaviest on the globe. The frequent occurrence of earthquakes is a great hindrance to the development of the country. A large portion of the country is covered with jungle, in which elephants, tigers, leopards, and other wild beasts are found in abundance. Large deposits of coal, iron, and petroleum are known to exist, but only the first is exploited to any extent. The soil is mostly very fertile, and the extensive forests contain numerous useful woods. The tea-plant is indigenous and tea-culture is making rapid strides. The area under tea is now about 300,000 acres, and the tea plantations are owned largely by Europeans. The great staple of agriculture is rice. The principal articles of export are rice, tea, silk, cotton, rubber, ivory, and gold. The commerce is mostly in the hands of the Jains. The population in 1901 was 6,122,201, showing an increase of 11.8 per cent. since 1891. Over 70 different languages and dialects are spoken in Assam. The seat of administration is Shillong.

The Assamese, or Ahoms, are probably a Hindu-Shan (Mongolian) mixed stock, with the Hindu element predominant. They are short and thickset, with coarse, black hair and Mongoloid face. Their language has some right to be classed as a sister-tongue of Hindi, Bengali, etc., and not as a mere dialect of the latter. It is spoken by about 4,500,000 people, the standard dialect being that of Nowgong. The Assamese literature is extremely scanty, although it employs a special alphabet of its own. The Assamese have a national festival called Baisakh Bihu, a gay occasion, in which young women especially are prominent. Besides the Assamese, the country contains a number of more primitive peoples (Lushai, etc.), whose language and folk-tales have recently been studied by Major Shakespeare (1898-99). Over 50 per cent. of the population are Hindu in faith. The Mohammedans number about 1,500,000.

Consult: Cooper, *The Mishmee Hills* (London, 1873); Hunter, *Statistical Account of Assam* (London, 1880); Reid, *Chin-Lushai Land* (Calcutta, 1894); Brown, *Grammatical Notes on the Assamese Language* (Nowgong, 1893); Bronson, *Dictionary in Assamese and English* (Sibsagor, 1867).

ASSAS′SINA′TION. The act of taking the life of any one by surprise or treacherous violence, either by a hired emissary, as in the case of political plots, or by a fanatic who hopes to further his ideas through the death of his victim, as in the case of anarchists (q.v.) in recent times. Generally the term is applied to the murder of a public personage by one who aims solely at the death of his victim. In ancient times assassination was not unknown, and was often even applauded, as in the scriptural instances of Ehud and Jael, and in the murder of Hipparchus by Harmodius and Aristogiton. The following list includes the most important assassinations, arranged in chronological order: Philip of Macedon, B.C. 336; Julius Cæsar, B.C. 44; Thomas à Becket, 1170; Albert I., Emperor of Germany, 1308; James I. of Scotland, 1437; Alessandro de' Medici, 1537; Cardinal Beaton, 1546; David Rizzio, 1566; Darnley, 1567; James, Earl of Murray, Regent of Scotland, 1570; William of Orange, 1584; Henry III. of France, by Jacques Clément, 1589; Henry IV. of France, by Ravaillac, 1610; Villiers, Duke of Buckingham, by Felton, 1628; Wallenstein, 1634; Archbishop Sharp, 1679; Gustavus III. of Sweden, 1792; Marat, by Charlotte Corday, 1793; General Kléber, at Cairo, 1800; Paul, Czar of Russia, 1801; Perceval, English premier, by Bellingham, 1812; Kotzebue, the dramatist, 1819; Duc de Berry, 1820; Charles III., Duke of Parma, 1854; Abraham Lincoln, by Booth, 1865; Michael, Prince of Servia, 1868; Marshal Prim, 1870; Georges Darboy, Archbishop of Paris, by communists, 1871; Earl of Mayo, Governor-General of India, 1872; Abdul Aziz, 1876; Alexander II., Czar of Russia, 1881; President J. A. Garfield, at Washington, by Guiteau, 1881; Lord Frederick Cavendish and T. H. Burke, Phœnix Park, Dublin, 1882; President Carnot of France, at Lyons, 1894; Stefan Stambuloff, in Sofia, Bulgaria, 1895; Empress Elizabeth, of Austria, at Geneva, by an anarchist, 1898; King Humbert I., of Italy, at Monza, by an anarchist, Bresci, 1900; President William McKinley, at Buffalo, N. Y., 1901. No mention is made here of the unsuccessful attempts at assassination, which would include nearly all the crowned heads of Europe and many of the prominent statesmen of Europe and America in the list of prospective victims. For the origin of the word, see ASSASSINS.

ASSAS'SINS (Fr. *assassin*, OF. plur. *hassasis*, from Ar. *hashashin*, plur. of *hashash*, hashish-eater). A secret order of Islam, partly religious and partly secular in character, and an offshoot of the sect of Ismaili, which was in turn a branch of the great Shiite faction. The members of the Order of Ismaili derived their name from Ismail, a descendant of Ali, in whose line they considered the religious headship of the Mohammedan world to be rightfully vested. They united to this tenet the belief in the moral indifference of all actions and in the worthlessness of popular religion. Toward the middle of the Eleventh Century, Hassan ben Sabbah, a Persian of gifted mind and energetic character, came to Cairo and attained to a high rank among the Initiated of the Ismaelite Order. Political reasons forced him to flee to Persia. In 1090 he acquired the fortress of Alamut, in the district of Rudba, and made it the home of a new organization, whose principles were in the main those of the Ismailites, with the addition of a new feature, namely: the practice of the secret assassination of all enemies of the Order. At the head of the new organization stood an absolute ruler, the Sheikh-al-Jebal, or, as he became known in mediæval folk-lore, 'The Old Man of the Mountain.' Below him were three deputy-masters, in the provinces of Jebal, Kohistan, and Syria. Next in rank were the Dais, or Initiated, and the Refiks, or Students, who were only partially acquainted with the secrets of the Order, but were graduated in time into the rank of Dais. Below these came the active members of the Order, the Fedavis, or Fedais, meaning 'The Devoted Ones,' young men who were kept in absolute ignorance of the teachings of the Order, but from whom complete obedience was expected. These were the blind instruments in the work of assassination planned by the leaders. Before they were assigned to their tasks these youths were stupefied by means of *hashish*, or the hemp plant, and while in an ecstatic condition they were plunged into all the pleasures of the senses as a foretaste of the bliss which awaited them in Paradise if they should faithfully execute the commands of their superiors. But the word *hashashin*, or hemp-eaters, was changed by the Europeans into *assassins*, and acquired the common meaning of murderers, which it bears at present. The novices, mechanics, and laborers formed the sixth and seventh classes of the Order, and upon them the observance of Islam was strictly enjoined, though the Initiated were exempted from its precepts. For 150 years the Order of Assassins held Asia Minor and Persia in terror. More than one caliph fell a victim to their knives. Princes paid tribute to the 'Old Man of the Mountain,' and the services of his followers were even hired by contending political factions. In all, there were six Grand Masters of the Order besides Hassan, who died in 1124. Of these, Hassan II., in 1163, extended the secret privilege of the Initiated (that is, exemption from the precepts of religion) to the people generally, and abolished Islam in his dominions; but he was speedily assassinated, and under his grandson, Hassan III., the old institutions were restored. Under Mohammed II. the Deputy Grand Master of Syria made himself independent, and during the wars of the Crusades wielded a terrible power. The murder of Conrad of Montferrat and other distinguished victims of assassination was attributed to him. The Mongol rulers of Persia broke up the Order in 1255. The Syrian branch was put down by the Mameluke Sultan Bibars; but remnants of the sect lingered in Kohistan, and are still said to exist in different parts of India, Persia, and Syria.

Consult: Hammer-Purgstall, *Geschichte der Assassinen* (Stuttgart and Tübingen, 1818); F. Walpole, *The Ansayrii, or Assassins* (London, 1851); Heckethorn's *Secret Societies of All Ages and Countries* (New York, 1897), which contains much curious information, but is ill-digested and unreliable; Guyard, *Fragments rélatifs à la doctrine des Ismaélis* (Paris, 1874-77).

ASSASSIN-BUG. A bug of the bloodsucking family Reduviidæ. See CONE-NOSE; and INSECT, paragraph *Poisonous Insects*.

ASSAULT (Lat. *ad*, to, at + *saltare*, to jump, leap). A military term signifying to attack. Until very recent times, troops would be told off to assault a fortified post, or position, being divided into three divisions: 'storming parties,' 'supports,' and 'firing parties.' It has always been a costly undertaking, and is now practically impossible owing to the modern guns and magazine rifles with which all armies are equipped. In the assault on the fortified lines of the Confederate army at Cold Harbor (1864), in the Civil War, General Grant lost some 8000 men in about fifteen minutes. All the great losses suffered by the British in the Boer War of 1899-1902 were inflicted during the time taken in covering the ground that separated them from the line of *kopjes*, under whose protection the Boers were fighting. See Attack.

ASSAULT AND BAT'TERY (Fr. *batterie*, from *battre*, to beat, batter). An infringement of the common-law right to personal safety and freedom. The words 'assault' and 'battery' are commonly used together, for the reason that the two offenses which they indicate are usually committed together. But the offenses are separate and distinct.

An assault is an attempt or offer to inflict bodily injury upon another, accompanied by such circumstances as denote, at the time, an intention, coupled with the present ability, to do violence to the person. Battery is the actual infliction of threatened violence, the consummation of an assault. Mere words of abuse will not constitute an assault; nor will a threat or offer to do violence, when it clearly appears that he who makes the threat or offer has no intention or no present ability to carry it into execution. But an *actual* intent or an *actual* present ability to injure the person is not necessary. It is sufficient that these are apparent and that the circumstances are such as to cause the person threatened to believe, on reasonable grounds, that such apparent intent and ability are real. Thus the pointing of an unloaded gun at a person who is ignorant of the fact that it is not loaded, the circumstances indicating an intention to shoot, will amount to an assault. The least touching of another's person in anger or willfully or negligently, whether with the hand or with a stone or other weapon, is a battery.

To use, or to attempt or offer to use, violence upon the body of another is in some cases justifiable. Thus a father or a schoolmaster may chastise a child, within proper bounds and in the process of rightful discipline. So a person is justified in using all necessary means, even though obliged to resort to force, to protect and defend his person, the person of his servant, or of one of his family, or his real or personal property. The force employed in defense, however, must be no greater than the emergency requires; for any excess of violence the person using it will be responsible, as for an assault and battery.

Assault and battery are both civil and criminal offenses. As civil wrongs they are classified under the head of torts, and subject the wrongdoer to an action for damages; and as crimes, under that of misdemeanors. Certain criminal assaults are known as aggravated assaults, and are followed by a more severe punishment. Such are assaults with intent to kill or with intent to commit rape, and assaults upon magistrates in courts of justice, with knowledge of the official character of the persons assaulted. See the authorities referred to under Criminal Law; and Torts.

ASSAYE, ȧs-sī′. A village in the northwest of Hyderabad, southern India, latitude 20° 18′ N., and longitude 75° 55′ E., 43 miles northeast of Aurangabad (Map: India, C 4). It claims notice chiefly as the scene of the first great victory of the Duke of Wellington, then Major-General Wellesley, won on September 23, 1803. The British troops in action were about 9500, while the Mahrattas, under Scindia and the Rajah of Berar, numbered 50,000, of whom 10,000 were commanded by French officers. Ninety-eight pieces of cannon, seven standards, all the baggage, and a large part of the ammunition of the Mahrattas fell into the hands of the conquerors, whose casualties numbered 1560 in killed and wounded. The loss of their opponents was 12,000.

ASSAY'ING (OF. *assai*, Lat. *exagium*, a weighing, weight: *exigere*, to drive out, examine, from *ex*, out + *agere*, to drive, lead, guide; cf. *examen*, for *exagmen*, and *exact*). In its widest meaning, the term includes all those operations of analytical chemistry which have for their object the determination of the value of ores and their metallurgical products. In its more limited meaning, assaying is the process employed in determining the proportion of pure metal in coins, silver and gold plate, jewelry and other commercial alloys of the precious metals. In Great Britain each article of gold or silver is assayed at the Goldsmith's Hall previously to being sold, to determine its standard of purity, and at the various mints of the United States and foreign governments, the bullion received for coinage is assayed for a similar purpose. Two general methods are employed for assaying metals and metal-bearing ores, which are commonly known as the wet method and the dry method. To the dry method belongs fire-assaying, and to the wet method belongs gravimetric analysis and volumetric analysis, including colorimetric determinations. Any attempt to define or explain these methods of analysis without technicalities, understood only by the chemist, is always somewhat disappointing, but the following definitions will give a general notion of what is meant in each case.

Fire-assay determinations involve the separation of the metal sought from the other constituents of the ore by the aid of heat and suitable fluxes, and its estimation by weighing in a state of purity. To illustrate, if the object is the determination of lead in an ore, the ore is mixed in a crucible with suitable fluxes and fused; the lead is returned to the metallic state, in which condition it is readily detached from the slag for weighing, the various non-metallic elements present in the original ore combining with the materials in the flux and forming new substances.

Gravimetric determinations involve the separation of the substance sought from the other constituents of the ore, and its estimation by weighing the substance either in a state of purity or as a constituent of a chemical compound whose composition is accurately known. To illustrate, if the object is the determination of lime in a mineral, the latter may be treated in such a manner that the ultimate product of the treatment is pure lime, which can be weighed direct; or the treatment may be such that the product is calcium sulphate, whose weight may be determined, and as this salt is of invariable composition the contained lime can be readily calculated.

Volumetric determinations are those which involve the separation of the substance to be determined from all interfering constituents of the ore, and the final measuring of the quantity of a solution necessary to complete a certain chemical reaction; or, as in the case of colorimetric determinations, by measuring the color imparted to a definite quantity of the liquid by the constituent sought, in comparison with the color imparted to the same quantity of water, or other suitable fluid, by a known quantity of the constituent sought. In fire assaying, generally but one constituent of the ore is determined from the assay of a single sample; in gravimetric analysis, frequently several or all of the constituents are determined from one sample; and in volumetric analysis a separate sample is taken for each determination.

SAMPLING. The first operation in making an assay is to select the sample. This work should be fairly done, no discrimination against any portion of the lot from which the sample is taken being allowable. There are two kinds of sampling: (1) ore sampling, and (2) sampling of metallurgical products. There are various methods of taking a sample of ore, it being done both by hand and by machine. One form of hand sampling only will be described here, which is generally termed quartering. This method is as follows: As the ore-cars are unloaded every tenth shovelful taken indiscriminately is thrown into a wheelbarrow as a sample. When about ten tons have thus been selected, it is shoveled into a conical heap, which is then flattened out into a circular cake and divided diametrically into quarters, as one would cut a pie. Two opposite quarters are then thrown aside, and the other two made into a second cone, which is flattened and quartered as before, two quarters being thrown aside and two shoveled into a third cone. This process is repeated, the ore being occasionally crushed smaller as the amount decreases, until the samples here remaining are a mass of powder, weighing from one to three pounds. This is ground until it will pass through a very fine sieve, and is spread out and filled into two sample bottles by taking portions here and there on the point of a steel spatula. In sampling metallurgical products, drillings are taken from the bars of metal, or the hot metal may be ladled directly from the furnace.

When an assayer receives a sample for determination, he proceeds first with a preliminary examination by means of microscopical studies and blowpipe tests to familiarize himself with the general character and composition of the substance. The formal analysis is then undertaken. The laboratory apparatus necessary for general assaying is quite extensive, consisting of a large variety of chemicals, balances, crucibles, cupels, furnaces, beakers, etc. A different mode of procedure is adopted in assaying different metals, and for illustration the method of assaying gold and silver by the fire-assay, and of silver by gravimetric analysis, will be described, the reader being referred to special treatises on assaying, metallurgy, and chemistry for details of the processes employed for other metals.

ASSAYING GOLD AND SILVER ORES. Gold and silver are generally associated together in ores, and such ores are universally determined by fire-assay. The fire-assay consists essentially in the collection of the gold and silver in a button of metallic lead, either by scorification or by fusion. The lead button is then freed from the adhering slag by hammering on an anvil, and is finally hammered into the form of a cube, when it is ready for cupellation. Both scorification and fusion consist in melting the ore with lead and certain fluxes; the fluxes used, the size of the ore sample, and the size and shape of the crucible differing in the two cases. The cube of lead, gold, and silver resulting from the scorification or fusion process is subjected to cupellation as follows: The cube is placed in a cupel, a small basin-shaped vessel, made of bone ash, and the cupel is placed in a small furnace of special construction, called a muffle furnace, which, as used in the United States assay offices, is heated by gas, but which may be constructed for use with either coal or coke. Owing to the heat, the lead in the cube is oxidized, part being absorbed by the cupel and part running off in fumes. Just before the last traces of the lead are removed, the melted button exhibits a play of colors, when the heat is increased to dispel the last of the lead, this being indicated by the 'brightening' or 'winking' of the button. The button is then cooled, cleared of adhering dirt, and carefully weighed. It now consists of silver and gold mixed. To determine the amount of each, the button is submitted to the process of parting. In order that the button will part it must contain at least 2½ times as much silver as gold, and should this not be the case sufficient silver is added and fused with the button to secure the proper proportions. The button is now hammered into a flat ribbon or strip and boiled in nitric acid, which removes all the silver and leaves the gold, which is fused and weighed.

ASSAYING SILVER BULLION. Silver bullion may be assayed by cupellation with lead, as explained above, the process being exactly as described for gold and silver ore, except for the preliminary scorification or fusing. The method of assay for silver bullion adopted by the United States mints and assay offices, and in the mints of most foreign countries, is volumetric analysis. Briefly described, this consists in dissolving the silver compound in nitric acid and then adding sodium chloride (common salt) solution, which insures the precipitation of the chloride of silver. The salt solution is made of definite strength, and is poured out of a graduated vessel until further precipitation of the silver ceases, when the amount of salt solution used is read off the graduated vessel, and by a simple calculation its equivalent in pure silver is determined.

ASSAYING GOLD BULLION. The assay of gold bullion requires the removal first of the base metals, and second of the contained silver. The base metal is removed by cupellation with lead, as described above, leaving a button of gold and silver. The silver is then removed from the gold by solution in nitric acid, the gold remaining behind in an insoluble state, when it is fused and the button weighed. The mode of assaying gold described cannot always be followed out in the examination of jewelry and other manufactured articles, as, though only a few grains are required for the assay, yet the removal of such might entail the destruction of the article, and in such circumstances the *touchstone* is resorted to. This stone was originally brought from Lydia, in Asia Minor, and consisted of a cross-grained quartz saturated with bituminous matter, but black basalt and other stones are now employed for the same purpose.

The manner of using the stone is to draw a streak upon it with the auriferous article; and from the color of the streak the richness of the gold can be very accurately determined by the practiced assayer. The subsequent action of nitric acid on the golden streak serves still further as a means of determining the purity of the metal, as the acid readily dissolves the copper and silver and leaves the gold. For a concise treatise on assaying see H. Van F. Furman. *A Manual of Practical Assaying* (Glasgow, 1893).

ASSAY′ OF′FICE. A government bureau where gold and silver bullion is assayed and refined. (See ASSAYING.) The assay offices of the United States are included in the Mint Service of the Treasury Department, and are located at the coinage mints of Philadelphia, San Francisco, and New Orleans; at the mints at Carson, Nev.; and Denver, Colo.; and at New York, N. Y.; Helena, Mont.; Charlotte, N. C.; St. Louis, Mo.; Deadwood, S. D.; and at Seattle, Wash. From the gold and silver deposited at the mints and assay offices, bars are manufactured, which are graded as follows: Fine bars, mint bars, standard bars, and unparted bars. The New York assay office is the largest, and more than half the gold and the greater part of the silver refined by the mint service is manufactured there. See MINT.

ASSE, ås. A fennec. See CAAMA.

ASSEGAI, ăs′sê-gā (Sp. *azagaya*, Ar. *az-zaghāyah*, from *al*, the + Berber *zaghāyah*, spear). A short spear used by natives of South Africa, especially the warlike Zulus, with a very thin shaft of hard wood of about five feet in length, and an iron blade secured by a strip of raw-hide. When used for throwing, the blade is convex on one side and concave on the other, for the purpose of transmitting a rotary motion.

ASSELYN, ås′se-līn, JAN (1610-60). A Dutch painter, pupil of Isaiah Van der Velde, and effective in landscape and animal pictures. He was one of the first Dutch artists to adopt Claude Lorraine's style.

ASSEMANI, äs′sê-mä′nê (Arabic, AL-SAMANI), GIUSEPPE SIMONE (1687-1768). A Syrian Orientalist. He was born at Tarabulus, Syria. He collected a large number of Oriental manuscripts in Egypt and Syria for the library of the Vatican, of which he was the custodian. His principal works are: *Bibliotheca Orientalis Clementino-Vaticana* (4 vols., Rome, 1719-28), containing the Syrian manuscripts of the library of the Vatican; *Opera Ephraëmi Syri* (6 vols., ib. 1732-46); *Kalendaria Ecclesiæ Universæ* (6 vols., ib. 1755-57); *Bibliotheca Juris Orientalis Canonici et Civilis* (5 vols., ib. 1762-66).

ASSEMANI, SIMONE (1752-1821). An Oriental scholar, a relative of Giuseppe Assemani. He was born at Tarabulus, Syria, was educated at Rome, and in 1785 was appointed professor of Oriental languages at Padua. His principal works are: *Museo cufico Naniano illustrato* (2 vols., Padua, 1787)—an important contribution to numismatics; and *Saggio sull' origine, culto, letteratura, e costumi degli Arabi avanti Maometto* (Padua, 1787).

ASSEMANI, STEFANO EVODIO (1707-82). A Syrian Orientalist. He followed the studies of his uncle, Giuseppe Simone Assemani, whom he succeeded as custodian of the Vatican Library. He was titular Archbishop of Apamæa. He published works on Oriental manuscript literature.

ASSEM′BLY (Fr. *assemblée*, ultimately from Lat. *ad*, to + *simul*, together. Any drum-beat or bugle-call designated to bring troops into ranks or to appointed stations. See BUGLE AND TRUMPET CALLS; and DRUM.

ASSEMBLY, GENERAL. See PRESBYTERIANISM; also LEGISLATURE.

ASSEMBLY, NATIONAL (France). The States-General (q.v.), convoked by Louis XVI. of France, and opened May 5, 1789, consisted of the two privileged orders, the clergy and the nobles, and of the *tiers-état*, or commons. The Third Estate, composed of representatives from the towns and rural communities, outnumbered the other orders, and demanded that the voting should be by heads, in united assembly, and not by orders sitting separately. Upon the refusal of the privileged orders to concede this demand the Third Estate, on June 17, assumed the title of *Assemblée Nationale*, and the right to act in the name of France. The court attempted to annul this resolution in a royal sitting, June 23, but the deputies of the Third Estate, together with the liberal members of the other two orders, had bound themselves three days before by the so-called Oath of the Tennis Court not to separate until they had given France a constitution, and declared every attempt at violence on the part of the court treason. The King yielded, commanding the nobles and clergy to join the National Assembly. The Revolution had begun. The Assembly proceeded with astounding rapidity to metamorphose old France. Feudal rights and hereditary privileges were abolished on August 4, and the Declaration of the Rights ot Man followed. In February, 1790, succession by primogeniture was abolished; in March, *lettres de cachet* and the oppressive salt tax were abolished; in June all orders and titles of nobility were annulled. In July the civil constitution of the clergy was decreed; at the same time non-Catholics were reinvested with the property forfeited by their ancestors on account of their faith; Jews were relieved from personal taxation, and the game-laws done away with. In September the Parliaments were suppressed. A decree of October 18 abolished the cruel criminal penalties of Louis XIV. In January, 1791, all corporations and guilds were abolished and free trade introduced. In February political rights were conceded to Quakers. In September all citizens, of whatever color or religion, received political rights.

The principles on which the Assembly proceeded were the sovereignty of the people, the limitation of the royal power through a conditional veto (q.v.), the separation of the legislative and the executive powers, and the responsibility of ministers. Accordingly, the Assembly, shortly after it was constituted, declared that to it alone, subject to the royal veto, belonged the legislative power. Several decrees in September, 1789, determined that the legislative body should form only one chamber, and should be renewed every two years; other decrees declared that the King was inviolable and the throne inalienable. A decree of November 7 forbade the deputies to undertake the place of ministers; and in December the new organization of the communes was begun. In January, 1790, France was divided into departments; in April trial by jury was introduced; in May it was declared that the right of war and peace belonged to the nation alone—that is, to the Assembly.

The financial reforms were equally sweeping. It was decreed at the outset that taxes were to be apportioned and raised without regard to person. A decree of November, 1789, ordered the publication of the public accounts; another in December established a national bank. In December, 1789, appeared a law sanctioning the issue of 400,000,000 francs' worth of assignats (q.v.), treasury notes based on the security of the public domain, and in April, 1790, a second decree made the assignats legal tender.

These measures were followed in the beginning of 1791 by a series of laws regarding coinage, taxation, the encouragement of industry and the management of the revenue. Catholicism ceased to be the State religion, tithes were abolished, and Church property was confiscated. Church ornaments and valuables were appropriated as patriotic gifts to the State; the civil jurisdiction of the bishops was taken away, and monks and nuns were freed from their vows. Under the civil constitution of the clergy each department was constituted a see, and the civil authorities controlled and paid bishops and curés. All the clergy were amenable to the civil courts, without appeal to the Pope, or the interference of any ecclesiastical authority whatever. Every clergyman had to take an oath accepting this constitution—a measure which led to the emigration of very many, and subsequently to enactments of excessive rigor against refractory priests (*prêtres insermenés*).

When the new constitution had been accepted by the King, and sworn to by the Assembly, that body closed its sittings, September 30, 1791. From its having framed the constitution (which lasted only twelve months), this assembly is usually called the Constituent Assembly. It made way for the *Legislative Assembly*, which was to reform the civil and criminal laws in accordance with the spirit of the new constitution. A decree provided that no member of the Constituent should be returned to the Legislative Assembly; and, as a result, the only men whose experience made them fit to carry on the work of the Revolution were excluded, and the Legislative Assembly was captured by untried and hot-headed radicals. The Assembly, from the very first, began an attack upon the remnants of the royal authority, which culminated in the rising of August 10, 1792, the suspension of the royal power, and the establishment of the Republic by the National Convention in September, 1792. The constitution had provided for an appeal to the nation in extreme cases, and the Legislative Assembly exercised that right by convoking a *National Convention* (q.v.), which was invested with the powers of the sovereign, was to decide the fate of the monarchy, and remodel the whole political system.

The title of National Assembly has been assumed by various other parliamentary bodies, originating in popular commotions, and aiming at radical political changes; as the French Assembly that met after the Revolution of February, 1848, followed, May, 1849, by a legislative assembly; the German National Assembly at Frankfort, known as the Frankfort Parliament (1848); the Prussian National (Constituent) Assembly; and the legislative body in France, which was instituted in 1871 after the fall of the Empire. Under the existing French Republic, the Senate and the Chamber of Deputies unite to form the National Assembly for amending the constitution and electing the President of the Republic.

For further information, consult: H. Morse-Stephens, *History of the French Revolution* (London and New York, 1886-91); Buchez and Roux, *Histoire parlementaire de la révolution française* (Paris, 1834-38); Thiers, *Histoire de la révolution française* (Paris, 1827); Doniol, *La révolution et la féodalité* (Paris, 1874); Montigny, *Mémoires de Mirabeau* (8 vols., Paris, 1834-43); Lafayette, *Mémoires* (6 vols., London, 1837). See FRANCE.

ASSEMBLY OF DIVINES′, or commonly called, from their place of meeting, the WESTMINSTER ASSEMBLY. A convocation appointed by the Long Parliament for settling the doctrine, liturgy, and government of the Church of England. It consisted of 121 clergymen and 30 laymen—10 of whom were lords and 20 commoners—together with 4 clerical and 2 lay commissioners from the Church of Scotland. It held its first meeting on July 1, 1643, and continued to sit until February 22, 1649, during which time it had met 1163 times. The Presbyterians formed a large majority in the Assembly, and exercised a corresponding influence on its decisions. In doctrine, the members were almost unanimous; but on the subject of Church government, opinions extremely opposite were maintained with keenness, especially on the question touching the sphere and limits of the civil power in matters ecclesiastical. The principal fruits of these deliberations were the *Directory of Public Worship*, submitted to Parliament April 20, 1644; the *Confession of Faith*, October and November, 1646; the *Shorter Catechism*, November 5, 1647; and the *Larger Catechism*, September 15, 1648. These several formularies, which contain a clear and rigid embodiment of Calvinistic theology and Presbyterian Church government, constitute to this day the authorized standards of the Presbyterian Churches of Scotland, Ireland, and England. The *Directory of Public Worship* was ratified by both houses of Parliament October 2, 1644, and the doctrinal part of the *Confession of Faith* in March, 1648. An order of the House of Commons, October 13, 1647, ordained that the Presbyterian form of Church government should be tried for a year, but no further legislation followed.

Consult: Hetherington, *History of the Westminster Assembly* (London, 1843); that by A. F. Mitchell, (London, 1882); and Masson, *Life of Milton*, Vol. II. (London, 1858-79), where a list of the members, with brief biographic notices, is given. See CREEDS AND CONFESSIONS.

ASSEMBLY OF LADIES. A poem, probably of the early years of the Sixteenth Century, copied after Chaucer's *Assembly of Foules*, and once attributed to him.

ASSEMBLY, UNLAWFUL. See RIOT.

ASSEN, ä′sen. The capital of the Province of Drenthe, in the Netherlands, 15½ miles by rail south of Groningen (Map: Netherlands, E 2).

By a canal (Hoofdvart) it is connected with Meppel and the Zuyder Zee. Near the town are the 'Giants' Caves,' mentioned by Tacitus, with huge stones resembling those at Stonehenge. Population, 1900, 11,191.

ASSENT′, Royal (Lat. *assentari*, to agree with, assent, from *ad*, to + *sentire*, to feel). The official act by which the sanction of the Crown is given to bills which have passed both houses of Parliament. Under the modern parliamentary system this assent is given as a matter of course, the veto of the Crown on legislation being practically obsolete. But in theory, the royal assent is still necessary, all acts of Parliament being "by the King's majesty, by and with the advice and consent of the lords spiritual and temporal, and commons in Parliament assembled." See the article Veto. Consult: Blackstone, *Commentaries on the Laws of England;* Amos, *A Primer of the English Constitution and Government* (London, 1886).

ASSER, ä′sẽr, Tobias Michael Carel (1838—). A Dutch statesman, born in Amsterdam. He was appointed in 1862 professor of law in the Athenæum of Amsterdam, and from 1876 to 1893 held a similar chair in the university. In 1875 he became counselor to the Foreign Office, and in 1893 member of the Dutch Council of State. He was delegated to represent Holland in the Peace Conference at The Hague in 1899, and in the International Court of Arbitration in 1900. A profound student of international law, he has published *Schets van het Nederlandsche Handelsregt* (1899; "Outlines of Dutch Commercial Law); *Schets van het Internationaal Privaatregt* (1879; "Outlines of Private International Law"); *La codification du droit international* (1901), and other works.

ASSESS′ORS (Lat. *assessor*, one who sits beside, from *ad*, to + *sedere*, to sit). In Roman law, persons who were called in by those administering public justice to sit with them, and give legal advice and assistance. The practice has continued in those European countries in which the Civil Law system prevails, and these assessors constitute a regular part of the judicial machinery. In Great Britain statutory provision is made for the employment of assessors in various courts. The House of Lords may call in the aid of one or more assessors in admiralty appeals; the Privy Council, in ecclesiastical cases; the Court of Appeal, in any cause or matter; and the county courts, on the application of either party. The admiralty division may call in nautical assessors, and in ecclesiastical courts the bishop sits with assessors. It is the practice in some of the United States district courts, sitting in admiralty, for the judge, even without statutory authority, to call in the assistance, in difficult negligence cases, of two experienced shipmasters, who sit with the judge during the argument, and give their advice upon questions of seamanship or the weight of testimony. Except in admiralty causes, the employment of assessors by courts does not obtain in this country. Our foreign consuls are authorized in various criminal cases to summon associates, who act in the capacity of assessors. (U. S. Rev. Stat., sec. 4106.)

In this country, however, the term is applied generally to officers who assess or value property for taxation. Their functions are partly ministerial and partly quasi-judicial. Where acting in a quasi-judicial capacity, they are not liable to a civil action for errors of judgment; nor in some States, e.g. New York, for willful misconduct. The only redress for the taxpayer harmed by such misconduct is by a proceeding to review and correct the assessment, or by a criminal prosecution. Consult the works referred to under the titles Civil Law; Admiralty Law; and Tax.

ASSETEAGUE, ăs′sê-tēg′, **IS′LAND.** A small island off the eastern coast of Virginia, forming a part of Northampton County. It is surmounted by a brick lighthouse 129 feet high.

AS′SETS (Lat. *ad satis*, up to what is enough). One of those terms in the law of England which in itself bears evidence of a Norman origin. It is derived from the French word *assez*, or more exactly, in Norman-French, *assetz*, 'enough,' or 'sufficient,' signifying the property of a deceased person, which is sufficient in the hands of his executor and heir for the payment of his debts and legacies. In strictness, therefore, the term is not applicable to the property of a person who dies intestate, and without any debts to be paid. In general acceptation, however, it is understood to mean the property left for distribution by a deceased person, whether testate or intestate; and in commerce, and also in bankruptcy and insolvency, the term is used to designate the stock in trade and entire property of all sorts belonging to a merchant or trading association, or to a bankrupt or insolvent.

Assets, in the law of administration, are either *personal* or *real*, the former comprehending such goods, chattels, and debts as devolve on the executor, and the latter including all real estate, whether devised or descending to the heir at law. In connection with this distinction, assets are also said to be *assets by descent*, and *assets in hand*, the former of these being recoverable from the heir to whom the land descends, and so far as such lands will extend; assets in hand, again, signifying such property as a person leaves to his executors, sufficient for the clearing of burdens and bequests affecting his personal estate. Assets are also in their nature either *legal* or *equitable*, according to the nature of the remedy which may be used by creditors against the executor or heir. These distinctions were important in connection with the common-law rule that the realty of a deceased person was liable only for the payment of specialty debts (i.e. debts secured by a sealed instrument, as a bond), unless made liable for the payment of other debts by will. In the former case, the specialty creditor was compelled to proceed against the heir or devisee; and in the latter case, simple contract creditors might proceed against the executor to recover from either the real estate devised or from the personal property of the decedent. In the case of equitable assets, courts of equity made no distinction between specialty and simple contract creditors, and distributed the assets among both classes of creditors without preference. Under modern statutes all creditors are placed on an equal footing, and, where there are several creditors, the executor or administrator is bound to pay him who first obtains judgment for his debt; and he cannot resist on the ground that nothing will be left for the other creditors. If, after exhausting the whole assets which have come to his hands, by the payment of debts in due order, he be afterwards sued by a creditor remaining unpaid, he is entitled to protect himself by an allegation that he has fully administered, or, technically, by a plea of *plene administravit;* and upon this plea the creditor is entitled to judgment that he shall be paid out of any other assets that shall come to the defendants, which is called a judgment of assets *in futuro.*

Assets is not a technical term in Scotland, but it is nevertheless much used in the legal business of that country. Consult the authorities referred to under ADMINISTRATION; BANKRUPTCY; DISTRIBUTION; INSOLVENCY.

AS'SIDE'ANS. See CHASIDIM.

ASSIENTO, ȧ-syăn'tō (Sp. *asiento*, seat, contract, treaty). A word specially applied to a compact between Spain and some foreign nation, according to which the Spanish Government conferred upon the latter, under certain conditions, the monopoly of the supply of negroes for its American colonies. It was Charles I. of Spain who first concluded an assiento with the Flemings, in 1517. Next, a similar compact was entered into with the Genoese (1580), the Portuguese (1696), and on the accession of Philip V. to the Spanish throne, in 1702, with the French Guinea Company, which from that time took the name of the Assiento Company, upon the understanding that for ten years it should have the exclusive right of annually importing 4800 negroes into the continent and islands of Spanish America. The assiento was next transferred to England at the peace of Utrecht, in 1713, and made over by Government to the South Sea Company for thirty years, permission being also granted to the company to send yearly, during the term of contract, a ship, carrying 500 tons of goods, to these Spanish colonies. The misunderstanding that grew out of this last clause, of which England took advantage to carry on an extensive contraband trade, contributed not a little to the war that broke out between the two nations in 1739. By the treaty of Aix-la-Chapelle the South Sea Company was confirmed in its title to the assiento for a period of four years, but this right was surrendered in the treaty of Madrid, October 5, 1750.

ASSIER, ȧ'syȧ', ADOLPHE D' (1828—). A French traveler and philologist, born at Labastide de Séron. He became professor of mathematics and member of the Academy of Sciences at Bordeaux, and made numerous voyages abroad, results of which are embodied in the works: *Le Brésil contemporain, races, mœurs, institutions, paysages* (1867); and *Souvenirs des Pyrénées* (1872; 3d ed., 1885). He has also published various other important works, of which the following are devoted to philology: *Essai de grammaire générale, d'après la comparaison des principales langues indo-européennes* (1857); *Histoire naturelle du langage; physiologie du langage phonétique* (1867); *le langage graphique* (1868).

AS'SIGNA'TION. A legal term in Scotch conveyancing, analogous in meaning to the English word 'assignment' and 'conveyance,' signifying the process by which the holder of any right, or the creditor in any obligation, or the proprietor of any property not strictly feudal, transfers his right or estate to a third party. See ASSIGNMENT.

ASSIGNATIONS (Lat. *ad*, to + *signare*, to sign; cf. *assignats*). The paper currency of Russia, issued by Catherine II., about 1770, to assist in carrying on the war against Turkey. Like similar experiments in other countries, before and afterwards, the assignations started at par, but rapidly declined to less than 25 per cent. About twenty years later, the assignations were the general currency; but traders began to refuse them, and the most stringent edicts of Paul failed to force them into good standing. In the war with Napoleon, heavy issues were made, the value keeping steadily at about 4 rubles of paper to 1 of silver. The rate rose somewhat after the peace, and fluctuation became so troublesome that the Government fixed the value by special law. In 1839, the silver ruble was made the unit, and the value of assignations fixed at 3½ for 1 of silver. At the same time bills of credit were issued which took the place of the assignations.

ASSIGNATS, ȧ'sē'nyȧ' *or* ăs'ĭg-năts (Fr. *assignat*, from Lat. pp. *assignatus*, assigned, from *ad*, to + *signare*, to sign). Paper money issued during the French Revolution, which derived its name from the public domain *assigned* for its ultimate redemption. One of the earliest acts of the Revolutionary authorities was the confiscation of lands belonging to the Crown and the Church, to which later the estates of the *émigrés* were added. These lands were to be used as a source of income for the State, but the process of selling was too slow to meet the pressing needs of the treasury. The Government therefore issued what were practically treasury notes (q.v.), bearing interest at 5 per cent., for the total amount of 400,000,000 livres (francs). They were to be retired within five years from the proceeds of the sales of the national lands which were assigned to this purpose.

When first issued, the notes were sold in the market in the same way as treasury notes in our own history. They were in fact securities, the lowest denomination being of 200 livres ($40), and on the first issue, in December, 1789, were well received and suffered no depreciation. By a decree of April, 1790, these notes acquired a legal tender character, and the interest upon them was reduced to 3 per cent. The payment of interest, however, is not compatible with the legal tender quality of notes, and in October, 1790, it was suppressed, after the maximum issue had been increased in the preceding month to 1,200,000,000 francs.

After this date, the successive issues of this paper money became more and more rapid. As early as 1791 notes of 5 francs appeared; and later, notes of 10 sous (one-half franc) were issued. So rapid was the issue of notes that the record of their amount is lost; the formality of passing laws was omitted, and the executive authorities increased the issues by simple decrees. By the year 1793 the circulation had reached nearly 4,000,000,000 francs, but the actual value of the notes had sunk to one-fifth their nominal value. Futile efforts were made to sustain the value of the notes. An effort, late in 1793, to fund them, and thus restrict their quantity, proved ineffective, while penal provisions, culminating in a decree of September 23, 1793, punishing the refusal to take them in payment, or taking them at a discount, with death and confiscation of property, were equally powerless. The wholesale issue of paper money could only have the most disastrous results. In July, 1794, 100 francs in paper were valued at 34 francs in coin; but in January, 1795, the value had fallen to 18 francs, and in July of the same year was less than 3 francs. In February, 1796, when the issues were finally abandoned, 100 francs equaled about 30 centimes in coin. The whole issue of money had been upward of 45,000,000,000 francs. It was now proposed that the assignats be redeemed at the rate of 30 to 1 in a new form of paper money known as territorial *mandats*. The mandats had this advantage over assignats, that they enabled the holder to take possession of public lands immediately, while the assignats could be offered only in lieu of the purchase price at a sale. As much as 1,400,000,000 of this money was issued, but it soon lost any value which it might have had and was finally repudiated by the refusal of the Government to receive it at its own treasuries. By a law passed in July, 1796, it was enacted that every one was entitled to transact business in whatever medium he pleased, and that mandats might be taken only at their current value in private transactions, as well as in the payment of taxes. On May 21, 1797, all outstanding assignats were declared void. This riotous issue of paper worked rank injustice and a complete redistribution of the national wealth. If its history is comparatively unknown except in generalities, it is because it was only one of a vast number of measures which reversed the whole order of society during the Revolutionary period. Consult René Stourm, *Les finances de l'ancien régime et de la révolution française* (Paris, 1885).

AS'SIGNEE' IN BANK'RUPTCY. See Assignment; Insolvency.

ASSIGN'MENT (from Lat. *ad*, to + *signare*, to sign). In law, a transfer or making over (usually in writing) to another, of any property, real or personal, or of any right therein. The term is usually, although not with strict accuracy, applied to a transfer in writing, as distinguished from a transfer whose validity depends upon mere delivery or unwritten agreement; and it is more frequently applied to the transfer of personal property than of real property, which requires to be transferred by an instrument under seal, and which at early common law required other formalities, not referable to the doctrine of assignment, in order to effect the conveyance. The formal words of assignment are: *assign*, *transfer*, and *set-over*. At common law all personal property in being, and other property not yet in being, but having potential existence (as crops planted but not yet grown, the wool to be grown by the assignor's flock of sheep within the year, etc.) could be freely assigned, and the assignment vested a present property right in the assignee. Courts of equity also recognized assignments of property to be created *in futuro* when such assignments were made for value, and enforced them against the assignor whenever this property came into existence. At common law, the assignment of a chose in action, other than commercial paper, was forbidden, as violating the rules against maintenance (q.v.) and champerty (q.v.). Such assignments, nevertheless, conferred upon the assignee the right to sue in the assignor's name, and, if the assignment was made for value, equity would restrain the assignor from interfering with the assignee's rights thereunder. To this rule, however, there were certain exceptions, based on grounds of public policy. Thus equity refused to protect the assignment of the salary of a public officer or judge, rights of action based on personal torts, etc. In the United States, generally, assignments of legal choses in action capable of manual delivery, such as bonds and insurance policies, when accompanied by delivery, are protected by courts of equity, although made without consideration. Equitable choses in action have always been held assignable, although the assignment is made without consideration; and in the United States to-day legal choses in action are generally made subject to the same rule by statute.

An assignment for the *benefit of creditors* is an assignment of real or personal property, or both, to a trustee, usually made by an insolvent debtor for the protection of his creditors, and to obtain discharge from further obligations. These are regulated by special statutes in each jurisdiction. See Bill of Sale; Chose in Action; Bankruptcy; Insolvency; and Contracts.

ASSIM'ILA'TION (Lat. *assimilare*, *assimulare*, to make like, from *ad*, to + *similis*, like, similar) in Plants. The process by which foods are transformed into living substance. It is the final step in nutrition (q.v., where its relation to other processes is shown). The term has long been applied in plant-nutrition to the special process, photosynthesis (q.v.), by which green plants make a particular kind of food with the aid of light, since this is superficially the most striking feature of their nutrition. But when, with more careful analysis, there appeared need of a term to name the process in plants, as defined above, to which the word assimilation had long been applied by animal physiologists, and when there began to arise the confusion unavoidable from using the word in one sense for plants and in another for animals, some writers sought to escape the difficulty by using in the one case a qualifying word, as in the expression 'carbon assimilation' for photosynthesis. But it is better to use the word assimilation only for the conversion of foods into living protoplasm, and to apply other terms to food-getting and food-making.

Plant foods must undergo various changes before they actually form a part of the living protoplasm. Since at present the chemical composition of protoplasm is unknown and that of many foods is equally unknown, the chemical details by which the latter are converted into the former could hardly be ascertainable. Proteids seem to be most like protoplasm in chemical composition, and therefore constitute the most important group of foods for its immediate nutrition. Because they are so like protoplasm in many chemical reactions, it is supposed that the assimilation of proteids consists rather in a change in their molecular structure than in their composition, by which change they become very unstable. But nothing is really known about the matter. The assimilation of carbohydrate foods, which might well be distinguished from assimilation proper, involves profound chemical changes, with the incorporation of molecules of nitrogen and sulphur, and in some cases of phosphorus. Carbohydrates thus become converted into amides and proteids of various kinds. These processes go on most vigorously in the leaves of the green plants, probably because there is formed by the leaves a good supply of available carbohydrates, and to them are brought the nitrates and sulphates from which the other atomic groups needed may be obtained. But assimilation may occur wherever there is suitable food and active protoplasm. Like all other vital processes, it can go on only under certain conditions of temperature, moisture, etc. See CELL; PROTOPLASM; PHOTOSYNTHESIS; NUTRITION; FOOD OF PLANTS. For assimilation in animals, see NUTRITION.

ASSING, ăs′sĭng, LUDMILLA (1821-80). A German biographer, the niece of Varnhagen von Ense. She was adopted by her uncle after the death of her parents and received a superior education. She wrote for newspapers and reviews, and in 1857 a biography of Elisa, Countess von Ahlefeldt. She edited and published, after her uncle's death, Alexander von Humboldt's letters to him; also her uncle's memoirs and his diaries, in fourteen volumes. The political matter in the diaries so offended the court, that she was prosecuted and sentenced to eight months' imprisonment. But she had gone to Florence, and the punishment could not be inflicted. She immediately published the remaining volumes of the obnoxious diary, to which the court answered by the form of a trial and sentence to further imprisonment for two years.

ASSING, ROSA MARIA (1783-1840). A German poet, sister of Varnhagen von Ense. In 1815 she married Assing, a Königsberg physician, and settled at Hamburg, where her house soon became the resort of literary people, of whom one of the most eminent was the poet Chamisso. Her poems were issued in the year of her death under the title, *Rosa Marias poetischer Nachlass.*

ASSINI, ȧs-sē′nē. A seaport village and trading station in the Baule district, French Sudan, Africa. It lies between Lake Tando and the sea, on the Ivory Coast, about 120 miles west of Cape Coast Castle. Population, 3000.

ASSINIBOIA, ăs-sĭn′ĭ-boi′ȧ (Ojibwa, *asinni*, stone + *bwa*, the Dakota). A district in Canada, formed in 1882 out of the Northwest Territories, containing 90,340 square miles (Map: Northwest Territories, G 4). It is bounded on the north by Saskatchewan, on the east by Manitoba, on the south by the United States (Montana and North Dakota), and on the west by Alberta. The eastern third of the district belongs to the second or middle plateau (see NORTHWEST TERRITORIES), and has an average elevation of about 1600 feet. The remainder of the district to the west belongs to the third or west plateau, with an average elevation approaching 3000 feet. There are some stretches of level plain, but much of the surface is broken, some of the hill groups being very prominent. The northern and eastern portions of the district are drained by the Saskatchewan and Qu'Appelle rivers; the southwestern portion is drained by the tributaries of the Missouri. The precipitation is light, and the temperature is subject to great extremes of heat and cold. The severity of the winters is often moderated by the warm chinooks from the west. The greater portion of the district consists of prairies. The eastern plateau is best adapted to agriculture, there being a great deal of very excellent wheat land, and mixed farming is practicable. In this section the agricultural industry has developed considerably in very recent years. On the western plateau there is a greater variety of soils, and it is not so well adapted to cultivation, but is excellent for grazing purposes. Lignite is found in a large portion of the district, and is mined in the southeast corner. The Canadian Pacific Railroad runs east and west through the central portion of the district, and a branch line runs north into Saskatchewan, and another feeder approaches it from the southeast. Regina is the capital of the district, and also of the Northwest Territories. For further details see NORTHWEST TERRITORIES.

ASSINIBOIN, ăs-sĭn′ĭ-boin ('stone-boilers,' a name given by some of the Algonquian tribes, in allusion to their former method of boiling water by dropping hot stones into it). A tribe of Siouan stock, formerly roving over the plains between the Missouri and the middle Saskatchewan, on both sides of the Canadian border. They are said to have been originally a seceded band from the Yankton Sioux, and speak a dialect of the Sioux language, but are generally considered distinct from that tribe. They number about 2670, of whom 1300 are gathered on reservations at Fort Belknap and Fort Peck, in Montana, while the remainder are on reservations on the other side of the line in British America.

ASSINIBOINE. A Canadian river, formed by the junction of the Qu'Appelle and Souris rivers, in Macdonald County, Manitoba, whence it flows northeastward into the Red River at the city of Winnipeg (Map: Manitoba, K 5). From the source of its principal headwater, the Qu'Appelle, in the southeast of the Saskatchewan district, to its outlet in the Red River, it has a course of over 400 miles. The river and the Assiniboia Territory derive their names from the Assiniboin Indians. See ASSINIBOIN.

ASSISI, ȧs-sē′sē (anciently, Umbrian *Assisium*). An episcopal city in Central Italy, 15 miles east of Perugia (Map: Italy, G 4). It is famous as the birthplace of Saint Francis, whose body rests here in the crypt of the first monastery, of the Franciscan Order, which he founded in 1208. The monastery was suppressed in 1866, and part of the building was converted by the Government into a school for the sons of teachers. Its two churches, built one above the other, also date from the Thirteenth Century, and contain many old and valuable paintings and other objects of interest. Besides the 'convento sacro,' there are eleven other monasteries, of which the largest is the Portiuncula, which has a richly decorated church, with a cupola by Vignola. Every year, at the beginning of August, Assisi is visited by great numbers of pilgrims. Assisi has remains of the ancient Assisium, including the forum, the baths, and the aqueducts. In the piazza there stands a beautiful portico of the ancient temple of Minerva. There are olive groves and mineral springs in the vicinity. The manufactures are insignificant. Population, in 1881, 6704; in 1901 (commune), 17,378. Consult Cruikshank, *The Umbrian Towns* (London, 1901).

ASSIST'ANCE, Writ of. The process issuing from a court of equity to a sheriff, marshal, or similar officer, for the enforcement of an order or decree for the possession of lands. In England this process is now styled a writ of possession. Formerly, the latter term appears to have been confined to process for the enforcement of a decree for the possession of a leasehold interest in land; and in some of our States it is used to denote the process for enforcing a judgment in a common-law action for the possession of lands, while like process from a court of equity is called a writ of assistance. During our Colonial period writs of assistance were issued by the courts to officers of the customs, authorizing them to take a constable or other public officer, and to enter any building and there to seize, and thence to bring, goods upon which customs duties had not been paid. For a learned discussion of these writs, consult Quincy, *Reports, Superior Court of Judicature, Province of Massachusetts Bay, 1761-72; With an Appendix Upon Writs of Assistance* (Boston, 1865). See Otis, James.

ASSIZE' (Lat. *assidere*, to sit by, from *ad*, to + *sedere*, to sit). Originally, a jury sitting together for the trial of a cause. Later, it came to signify the court which summoned the jury by a commission of assize. In the plural form it is the equivalent of circuits, and is applied not only to the judicial assemblies of the superior courts in the various counties, for the trial of civil and criminal cases, but also to the sittings of such courts. The term is used, too, as synonymous with edict, or decree, or even with law. A *writ of assize* was an action to recover possession of land, so named because it commanded the sheriff to summon a jury, or assize. It was of great importance in the early history of the law of real property in England, but was superseded by the writ of ejectment and other simpler remedies. *Rents of assize* are the rents of freeholders or copyholders, which had been fixed or assized in amount by custom or otherwise, as distinguished from arbitrary or various rents. Consult Blackstone, *Commentaries on the Laws of England*.

ASSIZE OF CLAR'ENDON. See Clarendon, Assize of.

ASSIZE OF JERU'SALEM. The name given to a body of laws in the Latin kingdoms of Jerusalem and Cyprus, formerly supposed to have been compiled by Godfrey de Bouillon (Gibbon), but dating in reality from a later period. The assize consisted of two parts, the Assize of the High Court, and the Assize of the Court of Burgesses. In the "Key to the Assize," assize is defined as 'everything which one has seen in use and customary in the kingdoms of Jerusalem and Cypress.' This aids in determining the much-debated question of its history. The Assize of the High Court was probably a body of customs, unwritten for the most part, until Jean d'Ibelin, about 1255, attempted to frame them into a code. In order to give importance to his compilation, he inserted at the beginning a historical sketch, in which he states that the assize had been framed by Godfrey de Bouillon and deposited by him in the Church of the Holy Sepulchre, and that this code had been lost when Saladin conquered Jerusalem. This account is now recognized as fabulous. The book of Ibelin was reworked twice, in 1368 and in 1531, and the present text is based upon the latter redaction. The Assize of the Court of Burgesses was probably framed in the second half of the Twelfth Century, but the date is a disputed point. The two codes, together with the comments of jurists of the Thirteenth Century and later, throw much light upon the history of the Kingdom of Jerusalem, but the Assize of the High Court must be used with great caution, as it is a document of the Sixteenth Century, and as it has been revised twice to suit the needs of principalities other than the Latin Kingdom of Jerusalem; for the assize passed from Jerusalem to Cyprus, and later to the Morea, and was adapted to meet the needs of the later kingdoms. The best edition is by Beugnot in the *Recueil des historiens des Croisades* (1841-43). The Assizes of Antioch have been discovered, in an Armenian translation, and published, with a French version, at Venice, in 1876. See Dodu, *Institutions monarchiques dans le royaume latin de Jérusalem* (Paris, 1894).

ASSMANNSHAUSEN, äs'manz-hou'zen. A village in the Prussian Province of Hesse-Nassau, on the right bank of the Rhine, about three miles below Rüdesheim (Map: Germany, B 3). It is celebrated for its red wine, made of a Burgundy grape and distinguished for its aromatic flavor, its uncommon strength and fire. There are also mineral springs, used by rheumatics. Population, in 1895, 1100; in 1900, 1000.

ASSO'CIATED PRESS. See Press Association.

ASSOCIATE PRES'BYTERY, or The Seceders. See Presbyterianism.

ASSOCIATE SYNOD, sĭn'ŏd, Associate Presbytery. See Presbyterianism.

ASSO'CIA'TION. See Coöperation; Societies; Company. In psychology, see Association of Ideas.

ASSO'CIA'TIONISM. See Association of Ideas.

ASSOCIATION OF IDE'AS. The phrase 'association of ideas' seems to have been first used by the English philosopher, John Locke, although the facts to which it gives expression were often discussed long before Locke's time. Even as early as the time of Aristotle, we find four classes of association described; that is, four ways in which the mind passes from one idea to another. These are association by similarity, by contiguity, by contrast, and by succession. It was not, however, till the time of Hume that the principles of association became 'laws' which were intended to explain not only the way in which idea follows idea, but the means by which the mind builds up all its knowledge of the world. Hume conceived of association as a 'gentle force' arising in 'original qualities of human nature,' and 'pointing out to every one those simple ideas, which are most proper to be united into a complex one.' Since the days of Hume, the principle of association has played a very large part in various systems of philosophy, particularly among the writers of the empirical school of philosophy in England. It has been worked out most elaborately in the writings of James Mill, Alexander Bain, and Herbert Spencer. At times, the advocates of the doctrine have gone so far as to speak of association as a law as universal in the mental world as that of gravity in the physical world. The theory thus developed is known as associationism; a theory which sees in the laws of association the fundamental modes of mental action.

Association has now a different significance among writers on psychology. In the works to which we have referred it had not so much a psychological as an epistemological significance (see EPISTEMOLOGY); that is, it was regarded as a principle of explanation in our knowledge of things. As thus conceived, associationism implied an atomic arrangement of the mind, and furnished rather an external and mechanical means for putting the various elements of knowledge together than an intrinsic mode of synthesis. It is only very gradually that the association of ideas has come to lose its philosophical flavor within psychology, and to represent a grouping of mental processes instead of standing as an explanation of experience in general. But even within modern psychological systems it has received so many shades of meaning that it is hard to define. It has stood (*a*) as the one mode of connection of ideas; or (*b*) as the sole condition of reproduction, i.e. the way in which 'past' ideas are brought again to mind; or (*c*) as reproduction itself—as when one is said to associate black with sorrow; finally (*d*) it has signified a particular kind of grouping of mental elements. Let us see in what directions these conceptions are open to criticism.

First of all, we will examine association as the one mode of connection of ideas. This definition of association is too narrow. Unless we are content to make association a perfectly arbitrary thing, we must extend it beyond ideas. When, e.g. we look at stones, we seem to see a heavy, hard, rough, cold, resisting mass. What we actually see is, of course, only the 'look' of the stone; the shape, the color, and the brightness. We 'think in' the rest from what our past experience has told us of the 'properties' of the stone. This 'thinking in' is just the same kind of an operation as is to be found in association. We have a sense-experience completed by ideational elements. (See SENSATION; IDEA.) Since there is no successive 'calling up' of the parts, and since we have not a grouping of idea with idea, it is plain that we cannot speak of an association of ideas. No: we must rather speak of this form of connection as a *simultaneous association*.

From this simplest form of associative grouping we pass by short stages to the *successive association*, the association in which part follows part. Even here it need not be a sequence *of ideas* which is experienced. A *perception* may start the train. The sight of the stone may bring the verbal idea 'geology,' and this, in turn, the idea of the Carboniferous period, and so on. It is only in cases of abstraction—as in reverie—that our primitive pilot, perception, is off duty, and we are guided by the central nervous processes underlying ideation.

We may dismiss the theory that association is the sole cause of reproduction (the second definition) by pointing out that the previous joining of ideas is not the only cause for the reproduction of one by the other. This may be due—to mention only two exceptions—to mood (we are likely to recall melancholy events when we are in a melancholy mood); or to a similar relation which two ideas chance to have to a third (as when 'dog' reminds us of 'cat,' both standing in the class of domestic animals). But neither is association satisfactorily considered as reproduction or recollection itself. It becomes in this case only a subheading under memory, and tells us nothing of the relation in consciousness of process to process. This leaves us with only our final definition, which says no more than that when sensational and ideational elements group themselves under certain conditions they may be said to associate. Association then becomes simply the form of grouping in which the elements stand united. Let us look more closely into this group. First, we must distinguish between the processes which do the associating and the materials united in association. In the simultaneous association, it is always the sensational elements which start the association. These it is in the case of the stone which make the perception a stone-perception instead of a table or a wall-perception. It may happen, however, that a tendency toward reproduction of certain ideas wholly diverts the normal course of the association or the assimilation, as it may be called. Think, for example, of the apprehensive traveler who comes upon the stone in the dusk and takes it for a ghastly head. Or it may be mood, or sentiment, or temperament, or a violent emotion, which determines the course of the perception. Take, as an illustration, the transformation of the stone by poetic fancy into a treasure-casket or a plaything of the gods. When we look again, at the level of the successive associations, for the critical portion of the perception of idea, the part which does the associating, we find that it may be a single element or the whole perception or idea which is the determining factor. The red (sensation) in a sunset may bring the idea of blood; or a geometrical figure (perception) may suggest the arrangement of petals in a flower; or a melody (perception) an opera in which it has been sung.

The consideration of association as a form of mental connection removes one more difficulty which the older associationism encountered. It makes a more intimate relation within a perception or a train of ideas than the latter could posit. There is a unity in the associated members. We may even speak of a whole perception or train of ideas as being 'bright,' 'vivid,' 'pleasing,' as if it were a single thing. This would hardly be appropriate if the connection were entirely external and simply brought the elements into mere juxtaposition.

If, now, we are to speak of 'laws of association,' we can mean only the conditions under which a given association is made. These conditions will stand in place of the regularity with which the environment brings together certain groups of stimuli and presents them to the organism. Conceiving our laws thus, we find that the old category of contiguity comes nearest to expressing the truth of the matter. Similarity is a very doubtful rubric. In the first place, the term is too indefinite to be of much service. Almost anything may be considered more or less similar to anything else, and it is very hard to see how simple likeness should determine an association. At least, greater likeness does not seem to mean greater associability. It seems to be possible, in every case, to reduce an apparent 'association by similarity' to some other form; there may be partial identity, in which case the identical member of two groups is first experienced with one and then with the other, as the red of the sunset passing over into the red of blood; or there may be simple contiguity, the similar objects having stood together in experience; or there may be an indirect association, such as we found above, where two things stand in the same relation to a third, as two objects to the name of the class to which they belong.

On the other hand, 'contiguity' can be regarded as an explanation only when we think of it in terms of neural activity. It is true that we can state it in general psychological terms, saying that conscious connections once set up tend to persist, so that when a single item (sensation, fusion, perception) comes to consciousness, it tends to bring with it other items with which it has appeared before in consciousness. This formula, which may be regarded either as a law of habit—if we think of the tendency to persist—or as a law of redintegration—if we think of its results—receives, however, its full significance only when we translate it into physiological terms and state it as a tendency in the nervous system to do that which has been done before. Neural tracts which have once been excited together, tend to functionate together again; hence, if an excitation finds its way to one part of the brain, there is a tendency for the parts previously involved to be reëxcited. Now, just what path an excitation will take in any particular case we cannot foretell; but we are able to name with a good deal of certainty the factors which contribute to association, i.e. to state the conditions under which the tendency to form old connections is realized. At this point, experiment comes to our aid. It enables us to invite association under first one set of conditions and then another, and to watch the results. If a given process, *a*, has formed several connections, at various times, say, with *d*, *s*, and *z*, the one of these connections which is actually realized when *a* is brought to consciousness will depend upon the frequency of connection of each with *a*, the recency of connection, the relative vividness of *d*, *s*, and *z*, their relative positions in a series of processes, and their relative power to attract a wandering attention. The comparative values of these factors are determined by presenting to the observer simple stimuli (as colors, letters, or sounds), arranged in definite groups of two, and then asking him, when one member of a group is given again, to recall the other member which was previously given with it. The series are so arranged as to bring into prominence, one after another, the various factors.

In investigating association, we have not only to give a quantitative measure of associability in terms of sensational elements; we must also study (1) the influence of other processes which chance to stand in consciousness, and (2) the nature of the associative consciousness; i.e. we must note what there is in mind when an association is being made. The first of these problems is illustrated by the overwrought traveler who 'colors' his association by his apprehensiveness, or by the proof-reader who becomes interested in his page and easily overlooks typographical errors. The case is brought under experimental conditions by giving an incentive to reproduction under the influence of a suggested idea. If the word 'part' is seen an instant, for example, just after the word 'wine' has been pronounced, it is likely to be read 'port.' The experiment shows us (*a*) within what wide limits an association may be influenced by the appropriate, momentary trend of consciousness, which thus becomes part-incentive, and (*b*) it also illustrates the last condition of association named above: the greater power to fascinate the attention and start associations possessed by an idea when it bears a close resemblance to other contents of consciousness. The best way to solve our second problem—the analysis of associated contents—is to make the observer as much at his ease and as free from distracting influences as possible (seat him, say, in a dark room), and ask him to report in outline the associative train which follows from a word or sentence repeated to him. After this experience he is able to fill in the outline by describing minutely the nature and the amount of the associative material, whether made up of visual, or auditory, or other imagery; whether intense or weak; whether clear or obscure; whether full or thin, the number and arrangement of the ideas, the elements which carry the association and the changes in affective tone at the various stages of the process.

One other point connected with the analysis of associated contents deserves to be noticed. There is a well-marked tendency toward economy in mental functions. The mind becomes expert, as does the body, so that after carrying through laboriously a sequence of processes for some time, the operation becomes gradually curtailed. We think our thoughts out (if, indeed, we do not take them ready-made from our parents and neighbors), and then just use them as counters with a swift, shorthand review, without going through the trouble to 'think' or 'reason' every time we want to know. This mental ellipsis is common in the process leading to association. It is, as John Stuart Mill says, "like a stream which, breaking through its banks, cuts off a bend in its course." If we have the sequence *a b c* given several times, we become able to pass directly to *c* from *a* without the intermediate link *b* being given at all: *e.g.* *alarm—fire—loss*, and then *alarm—loss*. This is only another evidence that contents in an association form a whole, and not a mere sequence of events. Some psychologists have gone so far as to say that associations may be held together by a link which has never entered into consciousness at all. The evidence for this is not good, although it is a fact that often the links are hard to find, either because they are fleeting or because they are not attended to. A speaker's facial expression or gesture may recall, for example, an event or a place, even if the listener's attention is kept on the discourse. Nevertheless, a full attention is generally an aid to the forming of associative relations.

Beyond the search for conditions of association and the analysis of association, much work has been done on the duration of association and of its elements by the use of the reaction experiment. (See ACTION.) The time, for instance, is taken for the associating of an object seen or heard, with the idea of another object in the same class, as 'cat'—'dog.' The time depends both upon the factors in the association (each of the conditions mentioned above exerting an influence), and upon the individual associating. The individual factor is resolvable into differences in ideational type (the kind of ideas—visual, auditory, tactual, etc.—which the individual uses with greatest facility), and what have been called "differences in intellectual temperament," i.e. the tendency to associate general names with the names of individuals (the superordinating temperament), as man with Cæsar; or individuals with generals (the subordinating temperament), as Cæsar with man; or to associate ideas upon the same level of generality (coördinating temperament), as plant with animal.

When we have made a full analysis of the mind during association, and when we have a complete tabulation of the conditions under which association takes place, and have measured the temporal course of association, we shall have solved the problem which association presents to psychology. Even now (and experiment on association is comparatively new) we know that frequency, recency, vividness, position, and ability to attract the attention are real conditions upon which association depends; they are the credentials, so to speak, which gain for processes a place in consciousness. We are not to understand by this that past experiences are waiting in the antechamber of the subconscious; but only that by reason of frequent repetitions, or recent excitations, or what not, there is a tendency for nervous processes to discharge in such and such a way. So that neural disposition determines the direction of discharge, and this, in turn, the appearance in consciousness of the associated contents. This view of the matter makes it clear why there is no distinct bit of consciousness answering to the associative bond, but only conscious processes standing related, and hence more or less unified. The bond is a figure. More than this, we have set the time relations of the association and have learned that associated contents are now exceedingly rich and now a mere thread; that the mass is now intensive and now weak, now clear and now obscure, now directed by a single element, and now by the union of two or more streams of influence, now run through with pleasantness and now affectively indifferent; that successive association is, like every consciousness, kaleidoscopic, picking up processes here and dropping others there, but carried always by a common core, so that there is never a jump from one stage to another, never an hiatus within the chain, but invariably a gradual transition from point to point. These facts make clear to us that the old contention regarding the 'laws' of contiguity, similarity, contrast, etc., was, after all, a secondary matter, and that it is the analysis of the contents collected within the association and the factual conditions of association that are of prime importance.

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ASSOCIATIONS FOR THE ADVANCE′MENT OF SCI′ENCE. See Advancement of Science, Associations for the.

ASSO′CIA′TIVE LAW. One of the fundamental laws governing certain elementary processes of mathematics. It is first met in addition, being stated thus: The sum is the same in whatever way the addends are grouped, e.g. $(2 + 3) + 5 = 2 + (3 + 5)$: or, in general, $a + (b + c) = (a + b) + c$. The associative law of multiplication may be stated thus: The product is the same in whatever way the factors are grouped, e.g., $2 \cdot (3 \cdot 5) = (2 \cdot 3) \cdot 5$; or in general, $a \cdot (b \cdot c) = (a \cdot b) \cdot c$. Exponents and vectors are subject to similar laws.

ASSOLLANT, ȧs′sô′läɴ′, Jean-Baptiste Alfred (1827-86). A French writer. He was born in Aubusson; in 1852 visited America, and on his return published *Scènes de la vie des Etats-Unis* (1858), a series of brilliant and skillful sketches. He wrote a number of stories and romances, such as *Brancas* (1859), *Marcomir* (1873), and *Pendragon* (1881), and contributed to many of the leading Parisian journals. His political articles forcefully and bitterly attacked Imperialists and Opportunists. A charge of plagiarism was brought by him against Sardou, on the ground that the latter's *L'Oncle Sam* was copied from *Scènes de la vie*. A court of authors decided in favor of M. Sardou.

ASSOMMOIR, L', lȧ′sô′mwär′ (Fr., the bludgeon). A novel by Emile Zola, belonging to his early 'realistic' period, and dealing with the evils of drunkenness among the poor. It was published in 1877.

AS′SONANCE (Fr., from Lat. *ad*, to + *sonare*, to sound). A substitute for rhyme, consisting of a repetition of the same stressed vowels at the end of a line, without regard to the consonantal-sounds of the syllable. It was common in the early verse of the Romance peoples, and it has survived in popular poetry. Examples of assonance, taken from George Eliot's *Spanish Gypsy*, are *blackness* and *dances*, and *roaming* and *floating*. Assonance is much employed in Spanish poetry. See Spanish Literature.

ASSUAN, ȧ-swän′ (Ar. *al*, the + *souan*, the opening—i.e. at the mouth of the Nile). The ancient *Syene* (Gk. Συήνη). A town of Upper Egypt, on the east bank of the Nile, near the borders of Nubia and at the first cataract, about 40 miles north of the Tropic of Cancer (Map: Egypt, F 8). Assuan, which is six miles north of Philæ, has a garrison, and is the depôt for the caravan trade with the Sudan. In ancient times it was famous for its granite quarries, which were worked under the earliest Egyptian dynasties. Some quarries of red granite—'Syenite' from Syene, so called by Pliny—are still found in the neighborhood. On the western bank of the Nile there are many rock-hewn tombs of the Old and Middle Empires. The Roman poet Juvenal, whose keen satire was resented by the Imperial court, was banished to Syene, and lived there for some time as commander of the garrison. Assuan is gaining in commercial importance, on account of its position on the railway line to Alexandria, and the stimulus given to agricultural interests by the construction of the great Nile dam at this place will add to its prosperity. Its population, including the suburbs, is estimated at 10,000.

ASSUAN DAM AND WA′TERWORKS′. See Dams and Reservoirs.

ASSUMP'SIT (Lat. 3d pers. sing. perf. of *assumere*, to undertake). The technical name of a form of action at common law. It was first used as a form of action on the case (see CASE) after the Statute of Westminster II. (1285), in which the plaintiff pleaded that the defendant undertook to perform some act by doing or giving something, the breach of which undertaking resulted in damage to the plaintiff. If the defendant's promise or undertaking did not amount to the assumption of a common-law duty, a breach of which would be a tort (q.v.), it was necessary for the plaintiff to allege and prove that he had given consideration—that is, that he had given up a right or suffered a detriment in return for the defendant's promise—in order to show that he had suffered damage. This was the origin of the modern doctrine of consideration in the law of contracts. The action of assumpsit is now limited as an action on contract, and as quite distinct from actions on the case, notwithstanding their common origin. The term assumpsit is also applied in substantive law, though less frequently, to the promise, contract, or obligation of one against whom the action of assumpsit would lie. *Express* or *special* assumpsit is the form of assumpsit brought to recover damages for the breach of a bilateral contract, either express or implied in fact—that is, a contract in which the promise of one party to the contract is given in exchange for the promise of the other, the mutual promises being expressed in spoken or written language, or implied from the acts and conduct of the parties. It was not the proper form of action in which to recover on contracts under seal, the action in that case being in debt or covenant. *Common, general*, or *indebitatus* assumpsit is a form of assumpsit in which the use of that action was extended, for reasons now purely historical, so as to apply in nearly every case in which the common-law action of debt would lie. It was used to recover a liquidated sum of money, as distinguished from mere damages, as in an action to recover the purchase price of goods sold and delivered, or for money lent. The obligation to pay the liquidated sum may arise from contract, express or implied; or, in the absence of contract, it may be an obligation imposed on the defendant by law, sometimes incorrectly termed a contract implied in law, and known to modern legal writers as a *quasi contract* (q.v.). Thus, *indebitatus assumpsit* was at common law the proper form of action in which to recover a penalty imposed by statute or money paid by mistake.

In modern times the use of this form of assumpsit has been still further extended, so as to cover nearly all cases where the defendant is under an obligation to pay a sum of money to the plaintiff, even though unliquidated, provided the money is not payable as damages. The various forms of declaration in *indebitatus assumpsit* were known as *common counts* (q.v.). The usual plea to the declaration in assumpsit is at common law *non assumpsit*, under which the defendant may give in evidence most defenses. Consult Gould, *Treatise on the Principles of Pleading in Civil Actions* (Chicago, 1899).

ASSUMP'TION OF MO'SES. The title of a pseudo-epigraphical or apocryphal book giving an imaginary account of the reception of Moses into heaven. Jude, verse 9, is alleged to be a quotation from it. It was written in Hebrew or Aramaic, by a Pharisee, in Palestine, between A.D. 14 and 30, and is preserved only in a Latin translation.

ASSUMPTION OF THE VIR'GIN MA'RY. A festival of the Roman Catholic and Greek Churches, celebrated, according to Butler, before the sixth century, in both the East and the West, in commemoration of the assumption of the Virgin Mary into Heaven. Both churches keep August 15th, in memory of Mary's translation into glory, body and soul, by Christ and the angels.

ASSUR, äs'sōōr. See ASSYRIA.

ASSU'RANCE. See INSURANCE.

ASSURBANIPAL, äs'sōōr-bä'nê-päl'. See SARDANAPALUS; ASSYRIA.

AS'SUS, or **AS'SOS**. An ancient Hellenic seaport city in the Mysian Territory, Asia Minor, on the north shore of the Adramyttium Gulf, opposite, and 7 miles distant, from the coast of the Island of Mitylene (ancient Lesbos). The city rose in terraces from the shore, on a trachyte cone, 700 feet high, crowned by a temple of Athene, commanding a magnificent view. The site, now partly occupied by the village and seaport of Behram or Bekhram, is noted for its interesting archæological remains and historical associations. Strabo mentions the independent attitude of Assus during the latter Persian invasion. During the governorship of the eunuch Hermeas—a pupil of Plato—Xenocrates and Aristotle were invited guests at his court, and Aristotle married the ruler's niece. Later, Assus passed under the domination of Lysimachus and of the Kings of Pergamum. On their way from Troas to Mitylene, Saints Paul and Luke visited Assus, as recorded in Acts xx. 13. After the Byzantine period it sank into oblivion. Assus became a prolific quarry of building-stone, especially for the docks built at Constantinople after the Crimean War, but the scattered remains of the walls, the baths, the market-place, the Temple of Augustus, treasury, gymnasium, and the Temple of Athene, attest the city's ancient magnificence. The American archæological school at Athens has done much to make the treasures of Assus known. Consult Clark, "Investigation of Assus" in *Classical Series I. of the Archæological Institution of America* (Boston, 1882).

ASSWAN, à-swän'. See ASSUAN.

ASSYR'IA (Gk. *'Ασσυρία*, in O. Pers. inscriptions *Aþūrā*, E. Syr. *Athōr*, W. Syr. *Othūr*, Ar. *Athūr*, Assyr. *Asshur*. Later abbreviated to *Syria*). An ancient country in Mesopotamia. It took its name from the city of Ashur (Asshur, Assur), which was the earliest capital of the district. The country occupied the northern part of the Mesopotamian plain, and was bounded on the north by the mountains of Armenia; on the south by Susiana and Babylonia; on the east by Media; and on the west, according to some authorities, by the Tigris, according to others, by the watershed of the Euphrates; and this limit seems to be the more correct, for many Assyrian ruins are found to the west of the Tigris. Assyria was thus about 350 miles long from north to south, with a breadth varying from 170 to 300 miles, and embraced an area of about 75,000 square miles. This plain is diversified by mountain chains on the north and east, and watered by the Tigris and its affluents, between two of which—the Greater and the Lesser Zab—lay the finest part of the country, known at one time as Adiabene. This history of Assyria can now, with the aid of the cuneiform inscriptions recovered from the excavations in Mesopotamia, be traced back to about B.C. 1800, when its rulers, with their seat in the city of Ashur, first began to make their presence felt. How far beyond this period the settlements reach back, it is impossible to say. So much, however, is certain: that the earliest settlers of whom we have any knowledge belonged to the same branch of the Semitic race and spoke the same language as those settled in the south and known as Babylonians. Whether these settlers of Mesopotamia came from the north or the south—a question still in dispute, with indications, however, in favor of the south—the Mesopotamian culture begins in the south (see BABYLONIA) and spreads northward. As a consequence, Assyrian civilization, including its methods of government, its arts and sciences, is an offshoot of Babylonia, and it was only in improved methods of warfare that the Assyrians displayed any notable originality. The Assyrians were a more rugged and more warlike people than their southern cousins, and while the latter are not by any means lacking in political ambition, it is the Assyrians who consistently carry out the policy of territorial aggrandizement, and furnish the most noteworthy examples, prior to Alexander the Great, of the attempt to place the whole world under submission. The extension of power in Assyria begins, as in Babylonia, with the growing importance of a central society. About B.C. 1800 we find the rulers of Ashur, who bear titles which indicate that they exercised religious as well as secular leadership, holding sway over the northern part of Mesopotamia, and already beginning to extend their dominion even beyond these boundaries. They pass first of all into the mountainous regions of the east, and subsequently advancing to the west, they encounter the forces of Egypt, whose Asiatic campaigns begin about the same time as the rise of Assyria. Indeed, but for the Egyptians, who checked the extension of Assyrian power toward the west for some centuries, we should have seen the standards of the Assyrian armies planted on the shores of the Mediterranean. As it was, these armies directed their chief attention toward obtaining control of Babylonia. The conflict between Babylonia and Assyria, once begun, never entirely ceased. Occasionally there were temporary intervals of peace, brought about through stress of circumstances; but toward the end of the Eleventh Century Assyria, under the leadership of Tiglathpileser I. (c.1120 to 1090 B.C.), obtained a large measure of control over Babylonia, and the ruler emphasized this by taking to himself the title of 'King of the Four Quarters of the World,' which had previously been a prerogative of the rulers of the south. He extended and fortified his dominions to the north, northeast, and northwest. With him, too, begins that devotion to the arts which characterized the great monarchs of Assyria no less than their military expeditions. He once more made Ashur the capital of the kingdom, in place of Calah, to which the seat of government had been removed by Shalmaneser I. (c.1300 B.C.) and rebuilt the city, adorning it with extensive palaces and beautifying the temples of the gods.

A reaction appears to have ensued after the death of this King, for we find that under his successors Babylonia continued to occupy an independent position. From time to time the Babylonians crossed arms with the Assyrians; but while losing ground steadily, they continued to maintain themselves up to the period when Assyria reached the highest point in her glory. After two centuries which were comparatively uneventful, we reach in Asurnazirpal, who reigned from B.C. 885 to 860, a ruler of the first order, who, by his vigorous campaigns waged on all sides, brought Assyria permanently into the rank of great empires. Babylonia was humbled, and for the time gave up hope of regaining political supremacy. The Aramæan tribes skirting the Euphrates from south to north, who had given the Assyrians a great deal of trouble, were brought under firm subjection, and from all sides tribute poured into Nineveh, which had been made the capital shortly after the death of Tiglathpileser I. Nineveh now rapidly rose to the position of mistress of the Eastern world; and as one king succeeded another, each tried to outstrip his predecessor in adding to and beautifying the public structures and palaces and temples. Although Asurnazirpal did not undertake any campaigns farther west than the Orontes, the cities along the Phœnician coast sent him gifts as a conciliatory act. His successor, Shalmaneser II. (B.C. 859-825), actively pushed his armies in a westerly direction. For 26 years he maintained an unceasing military activity. Twenty-one times he crossed the Euphrates; no less than six campaigns were directed against Syria and Phœnicia; but although the King constantly speaks of victories and plunder, Assyria was unable to maintain her control at such a distance from the seat of government. In the north and northeast, likewise, the nations embraced every opportunity to revolt against the Assyrian yoke, and thus it happened that Assyrian kings were obliged to keep large standing armies, which were never idle.

A new source of trouble arose for these rulers in the internal disturbances that frequently shook the foundations of the Empire. The death of a ruler was generally the signal for an uprising, and often the heir to the throne organized a rebellion in his father's lifetime. It argues well for the strength of spirit displayed by her kings, and for the greatness of her resources, that Assyria was able to maintain herself for several centuries, on the whole, with a steady extension of her power and influence. In the days of Tiglathpileser III. (B.C. 745-27), the Aramaic States of Palestine, as well as the Kingdom of Israel, received a serious blow, and in the days of his successor, Shalmaneser IV., Samaria, the capital of Israel, was besieged; but before it was taken Shalmaneser died, and Sargon II. mounted the throne (B.C. 721-705). With him we approach the climax of Assyrian supremacy. A usurper, he had even greater difficulties to contend with than most of the rulers of Assyria; and yet he completely subjugated Babylonia, put an end to the power of the Hittites, who from their strongholds on the Orontes were a constant menace to Assyria, and checked the advance of Assyrian arms to the west. The Kingdom of Israel fell, Judæa became a vassal, and the cities of the Mediterranean were obliged to pay tribute. The districts of Musku and

Tabal to the northeast, Nairi and Urartu to the north and northwest, were once more invaded and subdued more effectively than before, though the successors of Sargon—Sennacherib (B.C. 706-681), Esarhaddon (B.C. 680-668), and Asurbanipal (B.C. 668-26)—were obliged again to send their armies in various directions, in order to maintain the supremacy of Assyrian dominion. Rebellions, however, were quickly put down. Defection was seriously punished, and the kingdom of Judah was among those that suffered from the tyranny of Assyrian rulers.

The great ambition of the Assyrian rulers was to gain control over Egypt, and in 673 Esarhaddon actually undertook an Egyptian campaign. A second followed in 670, in the course of which the King laid siege to Memphis, and practically secured control. In 668 he set out for a third time, but died on the way. Before setting out from Nineveh, he had his son Asurbanipal formally proclaimed as his successor, and had set another son, Shamash-Shumukin, over Babylonia. Asurbanipal took up the political legacy of Esarhaddon and entered Egypt in triumph, accompanied by twenty-two princes of the seacoast, who had joined him. Memphis was occupied without opposition, and Asurbanipal received the homage of the prefects and officials whom Esarhaddon had placed in authority, but who, after the departure of the King, had been forced to abandon their posts. For all that, the conquest was not permanent, and soon after Asurbanipal's departure a rebellion once again broke forth. Most of the King's time during his reign was occupied with Elam, to the southeast, and Babylonia, to the south. Media, to the east of Babylonia, held in check as long as Babylonia itself was powerful, grew in strength as Babylonia became weaker, and in time became a menace to Assyria as well as to Babylonia. Asurbanipal inflicted several severe defeats, and brought about a change of rulers. Still, he was as little able to obtain a permanent foothold here as in Egypt, and before the end of his reign Egypt and Elam, as well as the States of Syria and Palestine, were practically independent. He was more successful in Babylonia, though not until after a severe struggle. He had succeeded in quelling an uprising organized by his own brother, Shamash-Shumukin, in Babylonia. Shamash-Shumukin, in despair, committed suicide in B.C. 647, and henceforward Asurbanipal assumed the reins of government in the south likewise, though as a concession to the Babylonians he ruled under a different name (viz., Kandalani). Asurbanipal was unquestionably a great warrior; but upon his death the rapid decline of Assyria set in, and some twenty years afterwards—in B.C. 607—Nineveh fell by a combination of Babylonia, which again came to the front, with the Indo-European hordes in the north known as the Manda, or Scythians, who had for some generations been encroaching upon the domains of ancient Oriental civilization. Assyria fell, and with it departed the glory of Mesopotamia, for the Neo-Babylonian monarchy established by the Chaldæan Nabopolassar was of short duration. See Babylonia.

Government and Religion. The government of Assyria was, as everywhere in the ancient Orient, a monarchy in which the king was the undisputed autocrat. Everything centred in the monarch, and it is characteristic that, in the royal inscriptions detailing the campaigns, names of officers or officials are rarely mentioned. The king does everything, and in the pictorial representations is always placed in the foreground. Yet we know that in many campaigns the rulers themselves were not present, and that the organization of the vast armies necessarily involved delegating a large measure of authority to subordinates. The large cities had governors appointed by the king, and what did not fall directly under royal control was regulated by the priests, who were the judges of the courts, the scribes, the medical advisers, as well as the intermediaries between the gods and the people. The religion of the Assyrians was identical with that of Babylonia. Starting out with nature-worship, the particular object of nature personified—primarily the sun or the moon—became associated with a specific place, and as that place grew in importance, the deity who was the special patron of the place also assumed greater significance. In this way the chief deity worshiped in the ancient capital Ashur (Asshur, Assur), the name of whom was likewise Ashur, became the chief of the Assyrian pantheon, just as in the south Marduk, as the patron deity of the city of Babylon, became the head of the Babylonian pantheon. When the capital was transferred from Ashur to Calah, and subsequently to Nineveh, the worship of Ashur was too firmly established to permit of any change, and so the god moved to the new capital, just as he left the capital with the Assyrian armies and accompanied them from place to place. The large temples that grew up in Assyria entailed an elaborate organization of priests, which was modeled, as was the religious architecture, upon Babylonian prototypes. In the ritual probably some originality was displayed in Assyria, though the methods of ascertaining the will of the deity, by means of oracles and omens, were practically identical in the north and south. Special prayers, however, were composed by Assyrian priests to fit conditions prevailing in the north.

The dependence of Assyria upon Babylonia in everything pertaining to intellectual life is illustrated in the copies which Assyrian kings, notably Asurbanipal, had prepared of the vast literary productions—legends, epics, omen collections, medical compilations, text-books, etc.—which were the work of Babylonian priests, and formed the archives in the temples of Babylonia. The Assyrian priests likewise controlled the legal organization of the Empire; and the temples of the north, as in the south, were also the depositories in which records of commercial transactions, of legal disputes, of official procedure—such as division of estates, marriage settlements, forms of adoption, and the like—were kept. The material used for writing was clay, readily furnished by the soil, which was baked after the characters had been inscribed, and which proved to be most durable. See Cuneiform Inscriptions.

Excavations. The Assyrian cities, soon after the fall of the Empire, fell into decay. In the case of Nineveh, this decay was hastened by the destruction, through fire, of important edifices. After a few centuries, nothing but huge mounds were left to indicate the site of past glory, and it was reserved for the Nineteenth Century to reveal the remains of Assyria to the world. Excavations were begun by the Frenchman, Paul Emile Botta, in 1842, at a mound at Khorsabad, not far from Mosul, on the left bank of the Tigris, which proved to contain the remains of a magnificent palace erected by Sargon II. (B.C. 721-05). Three years were spent there by Botta, at the end of which time he had unearthed numerous chambers of the palace, revealing an abundance of sculptural representations, covered with inscriptions, statues, inscribed slabs, and numerous objects. Meanwhile the Englishman, Sir Austen Henry Layard, was making preparations to begin work at mounds directly opposite Mosul and some miles to the south. In 1845 he began the excavations, which, continued till 1850, were fraught with such startling results. He rediscovered Nineveh, of which Khorsabad to the north and the mound Nimrud to the south were suburbs. No less than five palaces and several temples were found by him, filled with sculptured objects and quantities of inscriptions. A notable find was the discovery of the royal 'brick' library gathered by Asurbanipal, of which some 30,000 fragments were sent to the British Museum. This collection, being copies of originals belonging to Babylonian temples, forms the chief source for the study of Babylonian literature and religion. After Layard came Rassam and George Smith, who made still further researches among the mounds opposite Mosul; but during the past four decades the chief activity of explorers has been directed to the mounds in the south, covering the remains of Babylonian cities, whose history carries us back to a far earlier period than that revealed by the discoveries in the mounds of Assyria proper.

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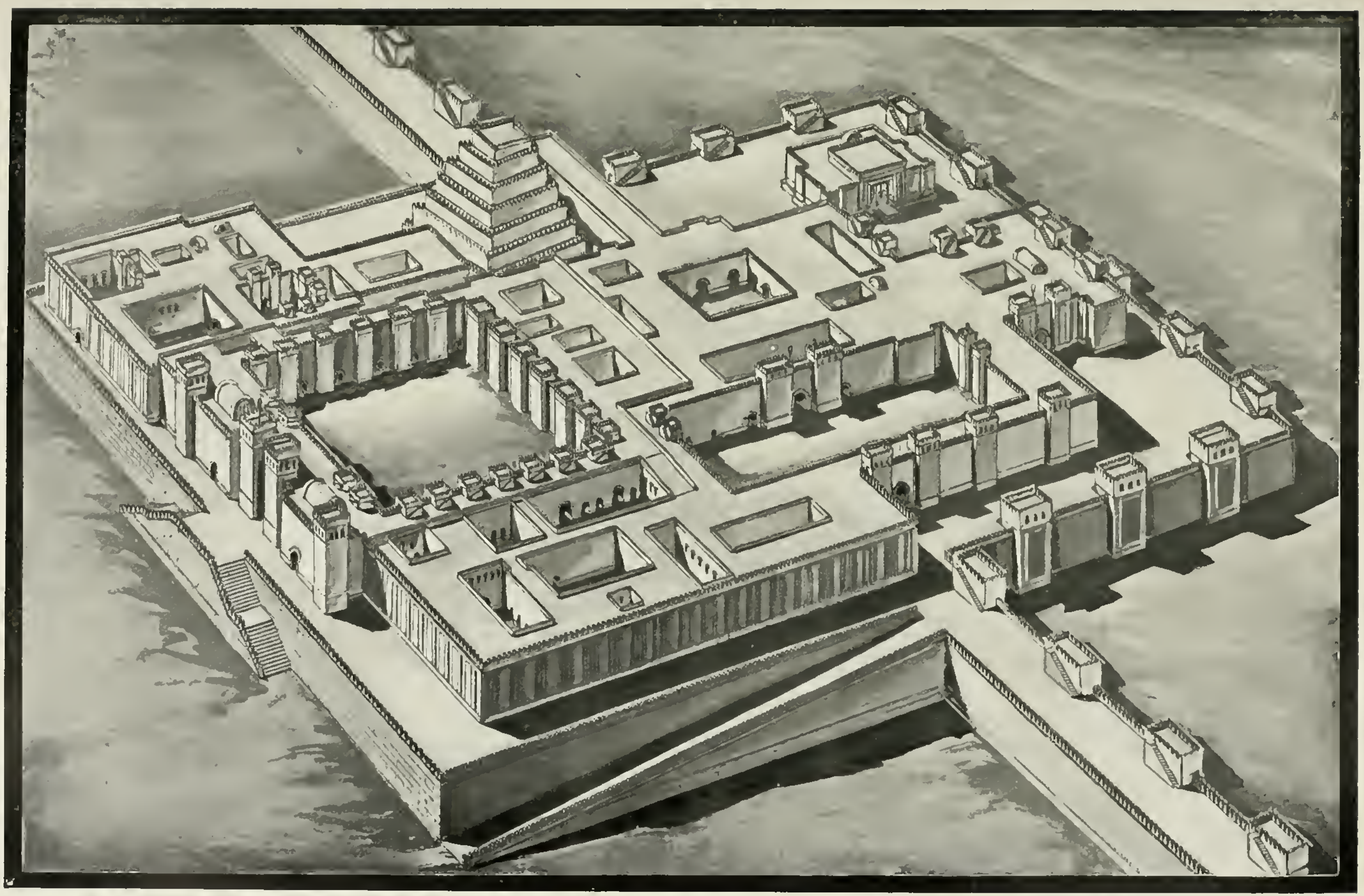
ASSYR'IAN ART. The historic inscriptions show that the earliest rulers of Assyria in the Seventeenth Century B.C. built monuments and enriched them with images, with colored decorations, and with hangings. None of these early works has yet been found, but it is probable that they resembled the art of Babylonia even more closely than later works, because at first the Assyrians, being cruder in their culture, were more imitative than when their national characteristics found artistic expression after Assyria became a great power. Roughly speaking, the following periods may be recognized: (1) Babylonish, Seventeenth to Twelfth centuries; (2) Archaic, Twelfth to Ninth centuries; (3) Developed, or Epic, Ninth to Eighth centuries; (4) Picturesque, Seventh Century. The temple and all forms of religious art, which predominated during the earliest centuries, had taken second place by the time of Asurnazirpal (Ninth Century), and the building and decorating of the royal palace, the celebrating of royal victories, exploits, and every-day life became and remained the principal theme of Assyrian art, in harmony with the despotic and secular character of Assyrian institutions. It is a help in tracing its history that nearly every king built at least one palace to commemorate his reign, in which everything was executed by his royal artists. The capital being successively shifted to Nineveh, Calah, and Ashur helped to multiply royal constructions. Beginning in the reign of Asurnazirpal, Assyria came in touch with every phase of Oriental art—Egyptian, Phœnician, Hittite, Ægean. The result was a strong reciprocal influence. Between the Ninth and Seventh centuries, Nineveh was the centre of the entire East for art as well as commerce; here colonies of foreign artists settled, and imitated or transformed the strongly marked character of Assyrian art, sending their works, by the hands especially of Phœnician traders, over the entire civilized world. This Assyrian supremacy did not cease until the fall of Nineveh, about B.C. 607. In describing the character of Assyrian art, it is not easy to detach the other arts from architecture, because the construction itself, being of brick, was necessarily so plain, so devoid of special features, such as colonnades or elaborate moldings, that both relief sculptures and color decoration were used for effect and became an integral part of architecture. Cult-images of the gods, often of precious metals, were placed in the temples, as well as reliefs with mythological subjects. Doors were covered with bronze-figured plaques, or carved in wood; obelisks and stiles were set up in the open air; but the favorite form of sculpture remained the low-relief frieze, and the favorite material, soft limestone. The industrial arts were highly developed. The king and his courtiers dressed in superbly embroidered and figured stuffs; the horses were superbly caparisoned; the arms and armor were highly finished; the king's throne was of carved ivory and gold, and the king was served out of gold, silver, and bronze vessels, with figures in relief. The Phœnicians and Syrians in particular were cunning workmen, who supplied all that Assyrian luxury demanded, and life was then as luxurious as under the Roman Empire. The bronze gates of Balawat, the dishes and ivories from Nimrud now in the British Museum, the carved cylinders and gems there and in the Louvre, Metropolitan Museum, and De Clercq Collection, show the character of the smaller arts.

ARCHITECTURE. The Assyrians copied the Babylonians far more closely in architecture than in the other arts. They employed brick in similar fashion, though they occasionally faced their substructures and walls with stone slabs as the Babylonians never did. Their temples were of the same pyramidal shape; their palaces on a similar quadrangular plan, with chambers also grouped around three courts. Color decoration was used, both outside in the form of reliefs of glazed faïence, and inside in wall-paintings and in the coloring of the sculptured dadoes in all the large halls and passageways. But we cannot yet say that in these particular forms which the Assyrians gave to their colored decoration they were following Babylonian models. Certainly, it seems as if they innovated in one very important particular, that is, in the use of long lines of bas-reliefs for internal decoration. The alabaster and soft limestone which they quarried on their borders had not been available to their southern neighbors, the Babylonians; and in these materials the Assyrian sculptor reveled quite as much as had the Egyptian, and he carved on these slabs sculptures appropriate in subject for all the different parts of the palaces and temples. There is nothing to show how the Assyrians treated sepulchral or private architecture, though future excavations may do this. But their military architecture can be studied on several sites, especially at Dur-Sargina (Khorsabad). The use of crude brick for the mass of all platforms, substructures, and bulk of walls subjected the buildings to the same disintegrating process through infiltration of water, as in Babylonia, which made constant repair necessary and led to the collapse of the vaults after the buildings had been abandoned. In fact, the Assyrian practice of using the crude bricks before they were dry produced a sort of brick amalgam far softer and more destructible than the Babylonian; nor were the Assyrians so careful to face this *pesé* with hard-burned and enameled bricks as were the Babylonians. In the interiors they usually protected it below by the dado of sculptured slabs and above only by a thin layer of painted stucco. In one way the Assyrians had the advantage, by using quarried stone blocks for facing their foundations; but, again, they did not use the good lime-mortar or beds of bitumen with which the Babylonians cemented their courses of brick.

The immensely thick walls—sometimes 20 and 30 feet—were made necessary by the great weight of the massive vaults and flat roofs, which made a second story impossible in palaces and houses, and also made it necessary to admit light from above, as windows cut through such walls would be almost useless. Both these facts made the residences extremely cool—a most important item in such a hot climate. Of course the Assyrian use of the arch, vault, and dome was rudimentary; each unit being supported on its solid walls, so that there were no long lines of arcades, no grouping of domes supported on piers. But there was a type of lighter architecture in accessories, such as porches and pavilions, shrines and small temples, summer-houses and belvederes. Here small columns of stone or marble, or of wood sheathed in metal (e.g. bronze), supported architraves and decorated roofs. Where fancy could have play without regard to structural necessities, we see the Assyrian supporting his columns on the backs of lions or sphinxes, surmounting their capitals with gazelles and antelopes. They here used capitals of at least two orders—cubic and Ionic—of extremely well-proportioned and appropriate types. But in these rather ephemeral works there lay such a contrast to the main buildings, with their heavy, unrelieved masses, that no harmony could be established between them.

The royal palaces of Assyria are its best preserved as well as most characteristic monuments. The religious fanaticism of the Babylonians had given to their temples the same preponderance that the civil despotism of Assyria gave to its palaces, in comparison with which the temples were insignificant. Long before Nineveh, the capital of Assyria was Calah, the modern Nimrud (q.v.). Here most of the prominent Assyrian kings from the Thirteenth to the Seventh Century built or rebuilt palaces. The palace of King Asurnazirpal (B.C. 885-860) has been most systematically excavated, and was the most artistic. That of Esarhaddon shows how, notwithstanding the dread of the curses called down upon such sacrilegious work, the pernicious habit was indulged in by the later Assyrian kings of despoiling older palaces to decorate their own. Nineveh itself is represented by the mounds of Nebbi Yunas and Koyunjik; only the latter has been excavated, especially the palaces of Sennacherib and Asurbanipal, whose sculptures decorate the British Museum. That of Sennacherib was magnificent. One of its vaulted halls measured 176 × 40 feet; another 124 × 30 feet. Many other mounds conceal superb palaces. One of these has been excavated with scientific care, the city and palace of Sargon at Khorsabad (q.v.), called Dur-Sargina, 'City of Sargon.' Sargon's own official account of its construction has been preserved in several inscriptions, and the ruins help us to understand it. Nothing in palace architecture of any age—not even Nero's Golden House—could have surpassed this Assyrian palace. It was built during B.C. 721-05, as a sort of Versailles to the neighboring Nineveh; it was never disturbed by later monarchs, and represents the plans of a single architect. As for the city, it formed an almost perfect square; it was on flat ground, as usual. Its walls are about 80 feet thick, and their present height of 40 to 60 feet is but a fraction of the original height, which was, however, considerably less than the 348 feet given by Herodotus to the walls of Babylon. They were strengthened by about 167 towers. On each of three sides were two gates, one of which was the decorated state gateway for foot-passengers, enriched with figured enameled bricks and sculptured bulls and winged genii. These gateways were immense edifices, covering 10,000 square yards, and their courts and vaulted halls and passages were the market-places and forums of the city. The royal palace itself made a break in the city-wall, being partly inside, partly outside the city-line. Its plan includes 209 apartments. Its level was high above that of the city, and its outer wall was defended by towers. The area covered was nearly 25 acres (128,500 square yards). The arrangement of apartments in three general groups each around a main court, supplemented by other smaller courts, is the clearest commentary upon the conditions of ancient life in the East, which have been more or less handed down to modern times. First comes the *Seraglio* for the men, joined to the *Selamlik*, or state apartments. Second is the *Harem*, or private apartments of the king, his wives, and their attendants. Third is the *Khan*, or dependencies, offices, and storerooms. The Seraglio itself had 10 courts and 60 apartments. Each court, with its chambers and passages, was a separate unit. Even the largest state court could be used, by the help of awnings, for ceremonial occasions. The



ASSYRIAN ARCHITECTURE

PALACE OF SARGON—RESTORATION

sculptures, enameled bricks, frescoes, colored stucco, marble pavements, and hangings made a gorgeous display.

Sculpture. When Layard, Botta, and Place made the first excavations in Assyria, it was the sculptures that excited the greatest amazement throughout the world. The colossal bulls and lions guarding the portals and the miles of scenes in low relief were unlike anything yet known in the history of art, and their interest was not merely artistic, since they furnished the most graphic information as to the life, costume, and history of the people. There are still gaps. A solitary female statue of the Fourteenth Century B.C. seems to hint that Babylonian models were then supreme, for its counterpart is found in earlier Babylonian terra-cottas and gems. But later works show that statuary was seldom produced, as the Assyrian artist never mastered its technique; the few remaining statues of kings—such as Asurnazirpal, Sennacherib, and Asurbanipal, or of divinities, like Nebo—when compared with the mass of relief-work, show that the heart of the Assyrian sculptor was not in this branch of his art. He did not know how to model the figure under the drapery, nor had he learned to treat drapery in folds, but only as a smooth sheath. The colossal man-headed bulls and lions are in reality not works in the round, but in relief, standing out from a central block. Where the Assyrian sculptor showed his power was in the observation of Nature eye to eye, and his ability to reproduce his impressions with realism without descending to triviality. In the royal hunting-scenes this is particularly striking. The lion standing regally in the royal park gazing down at the reclining lioness; the lioness shot through the spine and dragging along her paralyzed hind-quarters; the mortally wounded lion gnawing his paws; the scene of the wild-ass hunt, with the various stages of watchfulness, panic, and flight, wounding and tearing down by hounds; the hunting hounds themselves led in the leash—these and many more variations on similar themes are studies from life such as no other art has given us. Only the needlessly fastidious will carp at the amusingly primitive composition of some of these scenes, due to the entire absence of a knowledge of perspective. Each figure in itself is perfect; and when the artist confines himself to a simple frieze-like procession, as in the scenes of the return from the hunt with the dead animals, or the king in his chariot starting the game, his composition does not suffer even from this imperfection.

Up to the present no discoveries of relief sculptures have been made earlier than the time of Asurnazirpal in the early Ninth Century; but the art of his time, so powerful and complete, shows that probably even under the great Tiglathpileser in the Twelfth Century Assyrian sculpture must have freed itself from its Babylonian swaddling-clothes. When this was happening, Babylonian sculpture, after a development of some 3000 years, had fallen into absolute decay, and such works as those of Meredach-idinachi, lifeless and fussy, would have been incapable of inspiring a new art. In fact, the Assyrian sculptor found quite a new manner. Instead of the soft contours and delicate gradations of early Babylonian art, the Assyrian technique was sharp and clear-cut, the outlines distinct, the details given with accuracy. In the figures, the muscles, features, and hair; in the drapery, the patterns; and in the armor, harness, chariots, and other accessories, all the details are given with crisp touch. Doubtless the softness of the limestone that served as material helped the sculptor to realize his ideal, and to produce the immense quantity of contemporary annals in stone that amazes us. The realism was assisted by the use of color in figures, drapery, and accessories. The Assyrians in this polychromy of sculpture, as well as in the successful use of the frieze in low relief, were the worthy predecessors of Greek art. The sculptures themselves can be studied in European museums; there remain on Assyrian sites only the yet undiscovered works—probably numerous. Reliefs from Asurnazirpal's palace may be seen not only at the British Museum, whither the great bulk of them were taken, but also at the Gregorian Museum in the Vatican, at the Historical Society in New York, etc. They illustrate the simple, epic stage of Assyrian sculpture, and are mostly colossal figures arranged in a single row on the marble dado that decorated the rooms and corridors of the palaces. The figures are heavier and more strongly marked than later, and there are few or no accessories. What the course of development was during the next one hundred and fifty years we can only surmise, for the next large group of stone reliefs is that of the palace of Sargon at Khorsabad, now in the Louvre, which shows the last stage of this epic style; it is still colossal and simple, but while the guardian lion of Asurnazirpal snarls and strikes terror, the man-headed bulls of Sargon are genteel colossi of colorless mien. The processions, also, have lost the early fire. The time was ripe for a change of style, which appeared under Sargon's successor, Sennacherib, whose reliefs show the advent of a novel picturesqueness. Figures are multiplied on a background often full of accessories, of landscape, and of buildings; in place of the majestic frieze of large personages, small figures are scattered everywhere. It is true that more respect is shown to art by not allowing the rescriptive inscriptions which accompanied the reliefs to be run straight across the figures, as hitherto; but the defects consequent on ignorance of perspective are made far more conspicuous. This introduction of the pictorial element, in order to infuse new life into the art, seems to have been successful; for the art of the succeeding generation—that of Asurbanipal, whose sculptures form the most fascinating group in the British Museum—shows the good qualities of both the old and the new schools. There is a riot of many figures in the battle-scenes of the Elamite War; there is the quiet simplicity of the antique frieze in many hunting and banquet scenes. If we miss the greater force of the time of Asurnazirpal, there is an added delicacy.

The subjects of the reliefs fall into several categories. (1) Religious and mythological scenes were rare and belonged mostly to the temples, which have not yet been as fully explored as the palaces; there were statues of the gods and heroes, and reliefs of the conflict of Merodach with the dragon, the labors of Gilgamesh, and the wars of the evil spirits. (2) Scenes of contemporary history were particularly numerous. There were court sculptors who were as much the king's historiographers as were the writers. Every incident in a long war was portrayed in a fashion similar to that of the later artists in such works as the columns of Trajan and Marcus Aurelius. In such scenes as the battle of Susa, which completed Asurbanipal's conquest of Elam, each successive incident of the battle, even each separate phase of the duel of the two leading warriors, is given separately and side by side. It is a sort of moving panorama, which proceeds *pari passu* with the descriptive text. The Assyrian official annals of each yearly campaign are thus illustrated at every point. We see exactly how the Assyrian soldiers were armed and fought, marched, encamped, crossed rivers, attacked cities, slaughtered and tortured enemies, cooked, and sacrificed to the gods. (3) Scenes of daily peaceful life are only less numerous. The king banqueting with his queen in the palace garden, or hunting lions, gazelles, or wild asses; the construction of a royal palace; the royal horses led to the river to be watered; incidents of court life and glimpses of the royal parks, all show the versatility of the artist. It is, however, true that far less use is made of such material than was the case in Egypt, where many more details of manners and customs are portrayed. The Assyrian artist cared more for the official acts of his sovereign than for the life of the people or for the mysteries of religion. Consult the bibliography given in the preceding article.

AST, äst, Georg Anton Friedrich (1778-1841). A German philologist and philosopher. He became professor of classical literature at Landshut (1805) and at Munich (1826). Among his works were a *Handbuch der Aesthetik* (1805), *Grundriss der Geschichte der Philosophie* (1807), *Wissenschaftliche Darstellung der Grammatik, Hermeneutik und Kritik* (1808) *Platos Leben und Schriften* (1816), and an edition of Plato in eleven volumes with Latin translation and extensive notes.

ASTAR'BOARD. See Helm.

ASTARTE, ȧs-tär'tė. The woman whom the hero of Byron's *Manfred* had guiltily loved, and whose lovely shade appears to him at the close of the second act.

ASTARTE, ASH'TORETH. A goddess appearing frequently in the Old Testament (I. Kings xi. 5-33; II. Kings xxiii. 13), where she is called the goddess of the Sidonians. The form of her name in the Massoretic text of the Old Testament appears to be due to intentional perversion, her real name being Ashtart, to the consonated frame of which scribes infixed the vowels of Bosheth, 'shame,' thus producing the form Ashtoreth. Her worship was quite prevalent in the time of the Judges, and Solomon built a temple to her. Astarte was, however, not only the goddess of the Sidonians; the Bible mentions a temple of Astarte at Ashkelon (I. Sam. xxxi. 10), and from Semitic inscriptions we learn of a temple to Astarte at Citium in Cyprus, at Eryx in Sicily, as well as in Carthage. It is fair to infer, then, that she was a Phœnician goddess. From Cyprus her cult was carried to Greece and appears as that of Aphrodite. Astarte herself is not original with the Phœnicians. In Assyria there is an Ishtar, 'the Lady,' 'the Queen of the Gods,' 'the Goddess of War,' the planet Venus; she, too, is the goddess of various localities, 'Ishtar of Arbela,' 'Ishtar of Ninua,' and alone finally assumes a national position. In South Arabia there was a male deity Athtar, but very little is known of this god. Astarte is represented as a female figure, generally naked, rather short and round, with hands holding the breasts. The oldest representation of her is simply a white conical stone, but later, in Canaan and Phœnicia, she is typified in the form of a cow. From the biblical references it would appear that Astarte was regarded as the goddess of fertility and fruitfulness.

ASTAT'IC NEE'DLE (unstable, from Gk. ἀ, *a*, priv. + *στατός*, *statos*, standing). A compound magnetic needle which has little if any directive power and is composed of two magnetic needles suspended parallel in the same system, but with their poles reversed. The effect of one needle is to neutralize the other, and the result is the same as if a very weak needle were placed in the magnetic field. The chief use of the astatic needle is in the astatic galvanometer, where great sensitiveness is required. Possessing but a slight directive power, it will deflect under the action of very weak currents of electricity in the surrounding coils. (See Galvanometer.) A simple description of the astatic needle and the astatic galvanometer will be found in Silvanus P. Thompson, *Elementary Lessons in Electricity and Magnetism* (New York, 1901).

ASTAY'. See Anchor.

ASTEN, äs'ten, Friedrich Emil von (1842-78). A German astronomer. He was born at Cologne and studied at the University of Bonn. From 1870 he was connected with the observatory of Pulkova, Russia. He is chiefly known for his researches in connection with Encke's comet.

AS'TER (Lat., Gk. *ἀστήρ*, *astēr*, star). A genus of plants of the natural order *Compositæ*. The genus contains a great number of species, both herbaceous and shrubby, mostly natives of the United States. A number of perennial species are in cultivation as garden flowers. They bloom from July to November, and are among the most valuable hardy plants for border and roadside planting. The ray and the disk are of different colors. The New England aster (*Aster Novæ Angliæ*) is one of the most showy native American asters. The best known and most valued of all the asters is the China aster (*Aster Chinensis*), a summer annual, of which more than two hundred and fifty varieties are in cultivation, and new ones are continually being introduced. The plant was brought from China in the early part of the Eighteenth Century, and has been greatly improved by cultivation. The different varieties exhibit diversity of form and color. The plant prospers in a rich, free soil. *Aster argophyllus*, or *Haxtonia argophylla*, a native of Van Diemen's Land, is a whitish shrub, smelling strongly of musk. Consult: Cornell University Agricultural Experiment Station, *Bulletin 90*; Bailey, *The China Aster, with Remarks on Flower Beds* (Ithaca, 1895); Massachusetts Hatch Experiment Station, *Bulletin 79* (Amherst, 1902). For illustration see Araucaria.

ASTER, äs'tĕr, Ernst Ludwig von (1778-1855). A German military engineer. While an officer in the Saxon Army, then an ally of the French, he submitted to Napoleon in 1810 a plan for the fortification of Torgau. Napoleon became much interested in it, and the fortress was finished under Aster's superintendence. After the Russian campaign, in which he took part, he served in the Russian Army for some time, and then returned to the Saxon service. In 1815 he became colonel in the Prussian Army and after the battle of Waterloo, in which he was engaged, he was promoted to be general and made inspector of Prussian fortifications. He planned the elaborate defenses of Coblenz and Ehrenbreitstein, and was made commander of both fortresses. In 1827 he was promoted to be lieutenant-general, and in 1842, general of infantry. He left essays and other works posthumously published.

ASTERABAD, äs′tẽr-å-bäd′. See Astrabad.

ASTE′RIA. See Sapphire.

AS′TERISK (Gk. *ἀστερισκος*, *asteriskos*, a little star). A sign or symbol (*) used in writing and printing as a reference either to a note at the bottom or on the margin of the page. The obelisk or dagger (†) and many other marks are similarly employed; but when there are several references on the same page, it is now common to use the numerals 1, 2, 3, etc. The asterisk and other similar signs may have any arbitrary meaning assigned to them, at the will of the writer, an explanation being previously given what the signification is to be. The Greek grammarians, or critics, used the asterisk to mark a passage that had been unjustly suspected, but was to be held as genuine, or a passage in any way remarkable; the obelisk, again, marked an interpolated or an objectionable word or passage. See Textual Criticism.

ASTERN′. See Bearing.

AS′TEROIDS. See Planetoids.

AS′TEROPH′YLLITES (Gk. *ἀστήρ*, *astēr*, star + *φύλλον*, *phyllon*, leaf, alluding to the arrangement of the leaves). Fossil plant remains, formerly considered as representing a distinct genus, but now known to be, together with *Annularia* and *Sphenophyllum*, the heteromorphous leaves of the large group of *Calamites*, of Devonian, Carboniferous, and Permian time. See Calamites.

ASTHE′NIA (Gk. *ἀσθένεια*, *astheneia*, loss of strength, from *ἀ*, *a* priv. + *σθένος*, *sthenos*, strength). A specific, infectious disease of chickens, due to the attack of *Bacterium astheniæ*. The bacteria produced in cultures are found to be killed by immersion in a 1 per cent. solution of carbolic acid for five minutes, though they can vegetate between the temperatures 40° and 55° C. (104° to 131° F.). The most marked symptom of asthenia is extreme emaciation; the chief lesions are found in the duodenum; and in the contents of this part of the intestine the pathogenic organism occurs in large numbers. Thorough purgation followed by tonics has been recommended in the treatment of fowls suffering from asthenia. At present the disease is reported only in the United States, and is popularly known as 'going light.'

AS′THENO′PIA (Gk. *ἀ*, *a* priv. + *σθένος*, *sthenos*, strength + *ὤψ*, *ōps*, eye), or Weak Sight. A very common affection of the eye, caused by fatigue of the muscles moving the eyeball or of the ciliary muscle. It occurs most often in debilitated or neurasthenic persons, and its chief symptom is pain in or around the eyes, or headache, which is increased by use of the eyes, particularly upon near objects and in artificial light. If the strain is prolonged, the results may be temporary dimness of vision, sometimes double vision, confusion of the lines in reading, photophobia, irritability, itching and burning of the margins of the lids, and lachrymation. Disturbances of the stomach and of menstruation may also result. The affection may be muscular, accommodative, or nervous.

Muscular Asthenopia. This is caused by weakness of some of the muscles moving the eyeball, and often depends upon defects of sight. The symptoms result from the prolonged strain upon the weaker muscles in the effort to keep the visual axes of the eyes in the proper plane, in opposition to the action of stronger muscles.

Accommodative Asthenopia. This is due to strain and subsequent fatigue of the ciliary muscle which regulates the curvature of the crystalline lens. It occurs in various forms of defects of sight, such as astigmatism and hyperopia (see Sight, Defects of), and is due to the efforts of the ciliary muscle to alter the degree of curvature of the lens so as to bring rays of light entering the eye to a focus upon the retina.

Nervous Asthenopia. This is a functional disorder of the normal eye, depending upon hysteria, neurasthenia, or debility.

ASTHMA, ăs′må or ăz′må (Gk. *ἀσθμα*, short-drawn breath, panting, from *ἄειν*, *aein*, to blow). A disorder of the function of respiration characterized by acute attacks of difficult breathing accompanied by coughing, wheezing, and, in severe paroxysms, by slight asphyxia. Asthma most often develops after some slight catarrhal inflammation of the bronchial mucous membrane. There are a number of conditions which closely simulate this affection, which only the physician can diagnose. Every attack of shortness of breath is not asthma. The theories of its causation have been numerous, but the one that best explains the symptoms is that asthma is due to spasm of the muscle fibres in the walls of the bronchi. In some cases it seems to be a hereditary disease, and intensely nervous people seem to be more often affected. It occurs in men oftener than in women, and very frequently in children, especially after measles, bronchitis, or whooping cough. The attack usually begins quite suddenly, at night, announced by some preliminary sense of tightness. The patient wakes with much distress and anxiety, some pain in the chest, and great difficulty in breathing. The efforts to obtain air may necessitate great muscular exertion, and the patient may become covered with perspiration. The face may become purple and the eyes bloodshot. The attack may pass off and not reappear, but the disease is prone to be a chronic one. Treatment is mainly dietetic and hygienic. Dry inland climates are valuable. Bromides, iodides, nitrites, and opium are the drugs most widely employed. Consult Osler, *Principles and Practice of Medicine* (New York, 1901).

ASTI, äs′tē (anciently, *Asta Pompeia*). An episcopal city of Northern Italy, on the left bank of the Tanaro, 35 miles southeast of Turin (Map: Italy, C 3). The walls are dilapidated, the streets narrow and irregular, and the general appearance mediæval. The cathedral dates from 1348, and the Church of San Giovanni, built over an ancient Christian basilica, has monolithic columns bearing Sixth-Century symbols. Asti is famous for its sparkling wine (*Asti spumante*). It has trade in leather, woolen goods, hats, wine, and agricultural produce, and manufactures of silk. It excelled in the manufacture of pottery in ancient times. In the Middle Ages, it was one of the most powerful republics of Upper

Italy, and famous for its one hundred towers, of which thirty still remain. It was burned by the Emperor Frederick I. in 1155, and after a series of vicissitudes came into the possession of the Visconti of Milan, by whom it was ceded to the French, who held it till the middle of the Sixteenth Century, when it passed into the possession of the Dukes of Savoy. The poet Alfieri was born here in 1749. Population, in 1881 (commune), 32,233: in 1901, 38,045.

ASTIE, äs'tyâ', Jean Frédéric (1822-94). A Protestant theologian. He was born at Nérac, France, and studied at Geneva, Halle, and Berlin. He was a clergyman in New York from 1848 to 1853, when he removed to Paris. In 1855 he settled at Lausanne, Switzerland, where, in the following year, he was appointed professor of philosophy and theology. The influence of Kant, Schleiermacher and Vinet is revealed in his numerous writings on theology. In 1868 he became the editor of the *Revue de théologie et de philosophie*, which he conducted for many years.

ASTIG'MATISM (Gk. *ἀ*, *a* priv. + *στίγμα*, *stigma*, prick of a pointed instrument; spot, mark). A defect in vision caused by the refraction of light by the eye differently in different planes. To an eye thus affected, a pinhole in a paper may appear round, but when the paper is moved a little, the circular hole will seem to be an ellipse. Irregular astigmatism is that form in which there is a difference of refraction in various parts of the same meridian, as after injuries of the cornea or congenital defects in the lens. Regular astigmatism is that variety in which the degree of refraction of the two principal meridians differs. Astigmatism is usually due to differences in the curvature of the cornea; less frequently, of the lens. It is either simple, in which one meridian is normal and the other hyperopic; compound, in which both meridians are unequally hyperopic or myopic; or mixed, in which one is hyperopic and the other myopic. Astigmatism causes diminution of vision and asthenopia (q.v.), with its usual symptoms. It is corrected by glasses ground as cylinders, sphero-cylinders, or a combination of a spherical and a cylindrical lens; or by crossed cylinders, which are a combination of two cylindrical lenses, with their axes at right-angles to each other.

ASTLE, ăs'l, Thomas (1735-1803). An English antiquary and paleographer. He wrote *The Origin and Progress of Writing* (1784, reprinted 1876), an important contribution to English writings on the subject of paleography.

ASTLEY, ăst'lĭ, Philip (1742-1814). A noted English equestrian performer and manager. He was born at Newcastle-under-Lyme, and began work as a cabinet-maker, but enlisted as a cavalryman in the Seven Years' War, and after returning with an honorable discharge, gave exhibitions of horsemanship in Lambeth and elsewhere. At Lambeth he built, in 1770, a wooden circus, which grew, in course of prosperity and rebuilding after successive fires, into Astley's Royal Amphitheatre. This was the scene of a variety of exhibitions under his direction; but the special attraction was the equestrian performances, in which he himself excelled. He opened a similar establishment in Paris, which was seized for a barracks at the time of the Revolution, but he afterwards recovered possession of his property. He died in Paris, and was buried in Père-la-Chaise.

ASTOL'FO. An English noble in Charlemagne's train—a boastful but generous character. In Ariosto's *Orlando Furioso* he cures Orlando's madness, by bringing back from the moon the great Paladin's wits in a vial. He is renowned for his fairy gifts of a magic-horn, through whose notes all living things are panic-stricken, and a book which tells everything.

ASTOL'PHUS. See Aistulf.

AS'TON, William George (1841—). An Irish philologist and diplomat, born near Londonderry in 1841. He was educated (1859-63) at Queen's College, Belfast; one of his professors was Dr. James McCosh. He was appointed in 1864 student interpreter to the British Legation in Japan. He mastered the theory of the Japanese verb, and in Tokio began, with E. M. Satow, those profound researches into the Japanese language which laid the foundations of critical study in the Mikado's Empire. He held various offices in Japan until 1883; was made consul-general in Korea in 1884, and secretary of legation in Tokio in 1886. He retired on a pension in 1889. His publications include grammars of the Japanese language (1868 and 1872); a translation of the *Nihongi*, or *Annals of Ancient Japan* (1896), which show acute scholarship; *A History of Japanese Literature* (1899); and a great number of papers for learned societies on Korean and Japanese subjects, many of them in the *Transactions* of the Asiatic Society of Japan. His later work deals with rudimentary ethnic religions.

ASTON HALL. Supposedly the original of Irving's *Bracebridge Hall*. At any rate, before it was recently sold for a museum, it was in the possession of a Birmingham gentleman by the name of Charles Holt Bracebridge. It is an old hall in the Elizabethan style.

ASTON MAN'OR. A manufacturing town in Warwickshire, England, suburban to Birmingham (q.v.). Population, in 1891, 68,600; in 1901, 77,300.

AS'TOR, John Jacob (1763-1848). An American merchant. He was born in Waldorf, a village near Heidelberg, Germany, the son of a butcher. He followed his elder brother, first to London and then to New York, whither he went in 1783. He soon invested his small capital in furs, and by economy and industry he so increased his means that after six years he had acquired a fortune of $200,000. He traded directly with the Indians, peddling gewgaws among them, and buying their furs at a ridiculously low rate. At first he prepared the furs with his own hands and took them to the London market. He also became the New York agent of his brother's house, which dealt in musical instruments. Although the increasing influence of the English fur companies in North America was unfavorable to his plans, he ventured to fit out two expeditions to the Oregon Territory—one by land and one by sea—the purpose of which was to open up regular commercial intercourse with the natives. After many mishaps, his object was achieved in 1811, and the fur-trading station of Astoria (q.v.) was established; but the War of 1812 stopped its prosperity for a time.

From this period Astor's commercial connections extended over the entire globe, and his ships were found in every sea. He was especially successful in the China trade. He left property amounting to $30,000,000, largely invested in real estate, which has since enormously increased in value. The Astor House, on Lower Broadway, New York, was built by him. He left a legacy of $350,000 for the establishment of a public library in New York. (See Washington Irving's *Astoria* and James Parton's *Life of John Jacob Astor*, 1865). His wealth was mainly inherited by his son, William Backhouse, who continued to augment it till his death in 1875, when it had increased to about $50,000,000. During his lifetime he made many gifts to the Astor Library, and at his death left it $250,000 and books worth $200,000. He was known as the 'Landlord of New York,' from the extent of his property in that city.

ASTOR, John Jacob (1864—). An American capitalist, inventor, and soldier: the fourth of the name. He was born at Rhinebeck-on-Hudson, N. Y., graduated in 1888 at Harvard, traveled extensively, and has since been occupied chiefly with the management of the Astor estates. In 1894-96 he was on the staff of Gov. L. P. Morton, and in 1898 was commissioned Lieutenant-Colonel of United States Volunteers. During the Spanish-American War he served as a staff officer in the Santiago campaign, and presented to the Government a fully equipped mountain battery, which was named for him, and which did effective work in the campaign before Manila. He is known as an inventor of several useful devices, such as a bicycle-brake and a pneumatic road improver, and has published *A Journey in Other Worlds: A Romance of the Future* (1894).

ASTOR, William Waldorf (1848—). The great-grandson of John Jacob Astor. He was born in New York City, and studied law in order to qualify himself for assuming the management of the Astor estate. He was elected to the New York State Assembly in 1877, and to the Senate in 1879. In 1881 he was defeated by Roswell P. Flower as a candidate for Congress. He was appointed by President Arthur minister to Italy in 1882, a post which he held till March 1, 1885. As a result of studies made at Rome, he published two romances: *Valentino* (1885) and *Sforza* (1889). On the death of his father he became the head of the family and the inheritor of the estate, estimated at $200,000,000, largely invested in real estate. He soon built two magnificent hotels, the New Netherland and the Waldorf. In 1890 he went to London to live, and in 1899 became a British subject. He bought the *Pall Mall Gazette* in 1893, and founded the *Pall Mall Magazine*.

ASTORGA, ȧs-tōr′gȧ (anciently, Lat. *Asturica*). The capital of Asturia. A town of Spain in the Province of Leon, still surrounded by ancient Roman fortifications. In the neighborhood is a ruined castle of some interest to antiquarians. The town was once known as the 'City of Priests,' and in the Seventeenth Century, Emmanuele d'Astorga, the famous musician, spent some time in one of its convents in search of health. It is the see of a bishop.

ASTORGA, Emmanuele, Baron d' (1681-1736). An Italian composer. He was born at Palermo, December 11, 1681. His *Stabat Mater* is still regarded as a masterpiece. He wrote also an opera, *Dafne*, produced in Vienna in 1705. He derived his name from the Spanish convent of Astorga, where, after having studied with Scarlatti, he became a pupil. He died in Bohemia, August 21, 1736.

ASTO′RIA. A city, port of entry, and county-seat of Clatsop County, Ore., in the northwestern part of the State, on the south bank of the Columbia River (Map: Oregon, B 3). It is on the Astoria and Columbia River Railroad, and has several steamship lines to home and foreign ports. The former difficulty of the Columbia River bar has been overcome by the construction of a jetty, affording a deep and wide channel, which admits the largest vessels. There are now about five miles of water-front within the city limits. Astoria is the centre of an extensive salmon-fishing and canning industry, one of the most important in the world, and contains iron works, can factories, lumber mills, and other industrial establishments. It controls, also, a large export trade in lumber, wheat, flour, etc. The United States custom house and post-office, and Saint Mary's Hospital (Roman Catholic) are among the more important features of the city. Astoria, founded as a fur-trading station in 1811 by John Jacob Astor, was the first settlement in the valley of the Columbia. In 1813 the English took possession, renamed it Fort Saint George, and held it until 1818, though until 1845 the Northwest Company, an English company of fur-traders, continued to occupy it. In 1876 it was chartered as a city. Population, in 1890, 6184; in 1900, 8381.

Consult Washington Irving, *Astoria; or, Anecdotes of an Enterprise Beyond the Rocky Mountains* (Philadelphia, 1836).

ASTORIA. An account of Astoria, the settlement founded by John Jacob Astor on the Columbia River, by Washington Irving (1836).

AS′TOR LI′BRARY. See New York Public Library.

ASTOR PLACE RI′OT, The. In American history, a riot which occurred in Astor Place, New York City, on the evening of May 10, 1849, and which grew out of an attempt by partisans of the American actor Edwin Forrest (q.v.), assisted by the rabid anti-English element of the lower classes in the city, to prevent the English actor William C. Macready (q.v.) from giving a performance of *Macbeth* in the Astor Place Opera House. A disorderly crowd assembled in Astor Place early in the evening, and soon after the performance began, fiercely attacked the opera house and endeavored to force their way inside. The police proving unable to disperse the mob, the Seventh Regiment was called out; and before order could be restored, 34 of the rioters had been killed and many more wounded, while 141 of the militiamen had been more or less seriously injured by brickbats and stones. After the performance, Macready was taken to a private house, and two days later proceeded secretly to Boston, where he took ship for England. Consult: Wilson, *Memorial History of New York*, Vol III. (4 vols., New York, 1892-93), and Barrett, *Edwin Forrest* (Boston, 1882).

ASTRABAD, äs′trȧ-bäd′ (*Aster*, name of a river + Pers. *abad*, dwelling, town). A town of Persia: capital of the Province of Astrabad, situated in about latitude 37° N., and longitude 54°

30′ E., about 20 miles from Astrabad Bay (Caspian Sea) (Map: Persia, E 3). It is surrounded by a wall, and its streets and houses are substantially built and well kept. There are a number of ruined buildings, including the splendid palace erected by Shah Abbas. Astrabad contains an extensive bazaar and several fine mosques. It was long the residence of the Rajah princes, who are related to the present ruling house of Persia, and a number of whom are still living at Astrabad. The trade with Russia, which country has a naval station and a fort on the Island of Ashurada, in Astrabad Bay, has increased of late. The chief articles of export are cotton, rice, silk, grain, carpets, salt, and caviar. The port of Astrabad is Gez, a little village with a population of about 1200. Astrabad is connected by a caravan route with Afghanistan, and is the seat of a Russian consulate. The population is estimated at 18,000.

ASTRÆ′A (Gk. Ἀστραῖα, *Astraia*). A name applied by Ovid to the constellation Virgo, who, according to the story, left the earth at the end of the Gōlden Age, in grief at the wickedness of the Iron Age, and returned to the gods. Astræa is also the name of one of the planetoids (q.v.).

ASTRÆA, The Divine. Mrs. Aphra Behn, 'the first Englishwoman to live by her pen.' A vivacious and ingenious, though somewhat coarse, dramatist and novelist of the Eighteenth Century. Author of *Oroonoko*, the story of a 'royal slave.'

ASTRÆA RE′DUX (Lat., 'Astræa brought back'). A poem written by Dryden, commemorating the return of Charles II. It was published in 1660, only two years after the appearance of the same poet's obituary eulogy of Cromwell, "Heroic Stanzas." Admirers find in the later poem a line which they think explains the apparent contradiction in the poet's sympathies. According to them, the line, "To stanch the blood by breathing of the vein," means that Cromwell was justified in the execution of Charles II.'s father, but that Charles II.'s speedy succession to Cromwell was equally advantageous for England.

AS′TRAGAL (Lat. *astragalus*, from Gk. *ἀστράγαλος*, *astragalos*, the ball of the ankle-joint). In architecture, a rounded bead molding, either plain or divided into rounded sections; also the molded strip applied to the stiles of folding-doors.

ASTRAG′ALUS (Lat., Gk. *ἀστράγαλος*, *astragalos*). A bone of the foot, which, by a convex upper surface and smooth sides, forms, with the leg-bones, the hinge of the ankle-joint. Its lower surface is concave, and rests on the *os calcis*, or heel-bone, to which it is attached by a strong ligament. In front it has a round head, which rests in the concavity of the scaphoid, another bone of the tarsus, and upon an elastic ligament, its pressure upon which gives in a great measure the necessary elasticity to the foot. It is at this joint that inversion and eversion of the foot take place. It will be seen that the astragalus is a bone of great importance, as it supports the weight of the body in standing and enters into most of the movements of the foot. It is occasionally displaced, generally in a forward direction.

ASTRAGALUS. A genus of shrubby or herbaceous plants belonging to the order *Leguminosæ* and embracing about one thousand species. They are found in almost all parts of the world except in Australia. The leaves are pinnate and the pods more or less two-celled. They are commonly met with on dry soils. A number of species, among them *Astragalus gummifer*, yield gum tragacanth. In the western United States many species abound, and poisonous properties are attributed to some, which are called 'loco weeds.' *Astragalus mollissima* is a very common 'loco weed,' and horses or cattle eating it are said to lose appetite for anything else, become deranged, and finally die. See Gums.

ASTRAKHAN, äs′trȧ-κän′. Originally, a province of the Mongol Empire, but united with the Russian Empire in 1554. At present Astrakhan (within narrowed limits) forms one of the southeast governments of Russia in Europe, bordering on the Caspian Sea (Map: Russia, G 5). It is the fourth Government of Russia in order of size, having an area of over 91,337 square miles. The Government of Astrakhan is almost entirely a barren waste, the only fertile portions being the banks of the Volga, which divides the province into two equal parts, the steppes of the Kalmuks on its right, and of the Kirghiz on its left. The principal industry of the population is herring-fishing, in which are also engaged about 30,000 persons from the adjacent governments. The annual catch of herring ranges from 21,000,000 in bad years to 78,000,000 in good. The sturgeon fishery is very extensive. An auxiliary to the fishing industry is the procuring of salt from the lakes and from the marshes of the steppes, to the amount of about 300,000 tons annually, giving employment to more than 5000 persons. Another industry of importance is cattle-breeding, the only means of subsistence of the Kalmuks, Kirghiz, and a considerable portion of the Tartars. Agriculture thrives but poorly in this barren waste. The population, numbering 879,000 in 1892, and 995,000 in 1897, is composed of diverse elements—Russian, Tartar, Georgian, Armenian, Bokharese, Persian, and Hindu; about 300,000 people constitute the nomadic tribes of the Kirghiz and Kalmuks.

ASTRAKHAN (named after the Khan *Aster*). The capital of the government of the same name in Russia, situated on an island of the Volga, 60 miles from the Caspian Sea and 933 miles southeast of Moscow (Map: Russia, G 5). It is the seat of a Greek archbishop and an Armenian bishop; has Greek, Roman Catholic, Protestant, and Armenian churches; many mosques, an Indian temple, and a seminary for priests. The town is situated on very low ground, the average elevation reaching but 8½ feet above the level of the Volga, and its highest point not exceeding 46½ feet. It is irregularly built; the streets are filthy, since they are neither paved nor ever sprinkled or swept. There is no modern sewerage system, and cesspools contaminate the air. The low situation of the town has made it necessary to surround it by a wall of earth rising about 14 feet above the ordinary water-level of the Volga; all of which gives the place rather an Oriental appearance. The position of the town on the Volga, the greatest river in Europe, and its proximity to the Caspian Sea, an advantage which has been further enhanced by the construction of the Trans-Caspian Railway, make Astrakhan one of the most important commercial centres of Russia and the entrepôt for goods exchanged between Russia and Western Europe on the one hand, and Persia, Bokhara, Khiva, and other Middle Asiatic countries on the other. The chief articles of import from the East are gold, embroidered silken goods, silk stuffs, woolen goods, raw silk, rice, rhubarb, and drugs. The exports include cotton, linen, leather, paper, dry-goods, glass, paints, salt, and sugar. The annual value of the imports and exports is about 68,000,000 rubles (about $34,000,000). The industries do not show much progress and include chiefly the manufacture of silk goods, leather, paper, soap, and brick. There are over 70 docks, accommodating more than 4000 ships annually. The fisheries in the Volga employ a great number of the inhabitants of Astrakhan. The town gives its name also to a fine quality of fur, the product of a variety of sheep found in Bokhara, Persia, and Syria. There are many charitable institutions and hospitals. Population, in 1888, 73,700; in 1897, 113,000, including about 12,000 Tartars, 6000 Armenians, and 1000 Jews. Astrakhan was important during the Middle Ages. For several centuries it was in the hands of the Tartars, and did not come into undisputed possession of Russia until 1554.

AS'TRAL SPIR'ITS. In ancient Oriental and Greek religious systems, the spirits which animated and controlled the heavenly bodies (Gk. *ἄστρα*, *astra*). When these notions, possibly handed down by the Gnostics, passed into the demonology of the Middle Ages, the astral spirits were sometimes adapted into fallen angels—the transition being easy from the general belief that angels personally directed all physical manifestations, such as thunder-storms; sometimes they were conceived of as the souls of departed men, sometimes as spirits originating in fire, and hovering between heaven, earth, and hell, without belonging to any one of these provinces. Paracelsus and others attributed to every human being an astral spirit or sidereal element in which the human soul, or spirit proper, is thought to inhere, and which lives for a time after the person dies.

ASTRÉE, ás'trā'. A novel. See Urfé.

ASTRIN'GENTS (Lat. *ad*, to + *stringere*, to bind fast, tight). Medicines which cause contraction of tissues, and thus prevent excessive discharges of blood, mucus, and other secretions. They are used to arrest diarrhœa, hemorrhage, and discharges from mucous membranes. They act locally, although some claim that gallic acid is a remote astringent, tending to check hemorrhage in any part of the body when given by mouth. Astringents are of two classes, vegetable and mineral. The most important of the first class are: tannic and gallic acids derived from nut-gall, rhatany, catechu, kino, logwood, and white-oak bark. Mineral astringents include nitrate of silver, the sulphates of copper, zinc, and iron, chloride of iron, acetate of lead, alum, sulphuric, nitric, and hydrochloric acids.

AS'TROCAR'YUM (Gk. *ἄστρον*, *astron*, star + *κάρυον*, *karyon*, nut; referring to the arrangement of the fruits). A genus of palms, of which about thirty species are known, natives of tropical America, remarkable for the abundance of acute and formidable spines, in some cases a foot long, with which almost every part—stem, leaves, spathe, and fruit-stalk—is armed. They have beautiful pinnated leaves; some of them are lofty, others are of very moderate height, as 8 to 15 feet, while some are almost or altogether stemless, as *Astrocaryum acaule*, the Iu palm. The fruit of some species is eatable—a juicy pulp covering a stony seed—as the fruit of the Murumurú palm (*Astrocaryum murumurú*), the pulp of which is said to resemble a melon in flavor, has a sort of musky odor, and is highly esteemed. It is a palm only about 8 to 12 feet high, abundant about Pará and elsewhere on the Amazon. Cattle roam the forests in quest of its fruit, and swine fatten on the seed, which they crush with their teeth, although in hardness it almost resembles vegetable ivory. Another edible fruit is that of the Tucumá palm (*Astrocaryum tucuma*), abundant in the same regions. These fruits are about an inch long, the Murumurú ovate, the Tucumá almost globular. The Tucumá palm is 30 to 40 feet high, the stem encircled with narrow rings of black spines, which are disposed with beautiful regularity. The Tucum palm (*Astrocaryum vulgare*), a species quite distinct from the Tucumá, and more lofty, is of great importance to the Indians, and in places where it is not indigenous is cultivated with care for the sake of the epidermis of its unopened leaves, of which they make cordage, very useful for bowstrings, fishing-nets, etc. The fibre is at once fine, strong, and durable, and may yet perhaps become important as an article of commerce. Beautiful hammocks are made of Tucum thread, which are sold at about $15 each, or, if ornamented with feather-work borders, at twice that sum. Martius, in his great work on palms, has, by mistake, represented the Tucumá instead of the Tucum palm as yielding this fibre. (See Wallace, *Palm Trees of the Amazon* [London, 1853].) The fibre is obtained by cutting down the terminal bud or column of unopened leaves which rises from the centre of the crown of foliage. The tender leaflets are then carefully stripped of their epidermis, in pale, ribbon-like pellicles, which shrivel up almost to a thread. These are tied in bundles and dried, and are afterwards twisted into thread, or made into thicker cords, by mere rolling and manipulation. The mature leaves yield a coarser fibre, which varies considerably with the different species. It is used for cordage, and the split stems of the new leaves are braided into hats and baskets.

AS'TROLABE (Gk. *ἀστρολάβον*, *astrolabon*, star-taker). The name given by the Greeks to any circular instrument for observing the stars. Circular rings, arranged as in the armillary sphere, were used for this purpose. A projection of the sphere upon a plane, with a graduated rim and sights for taking altitudes, was known as an astrolabe in the palmy days of astrology, and was the badge of the astrologer. The astrolabe has been superseded by the more perfect instruments of modern astronomy.

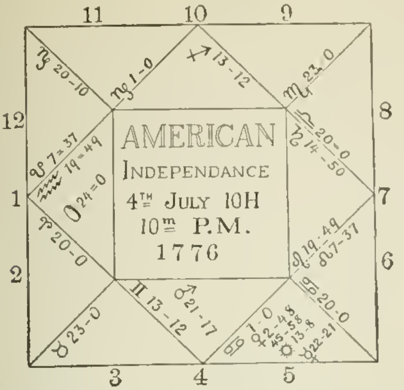
ASTROLABE, The, or The Conclusions of. A fragmentary prose treatise by Chaucer, written probably in 1391, for the instruction of his son Lewis. It is an English rendering, from a Latin copy, of a work by the Arabian astronomer, Messahala.

ASTROL'OGY (Gk. *ἄστρον*, *astron*, star + *λόγος*, *logos*, science). The term meant originally much the same as *astronomy*, 'the knowledge of the stars,' but was at length restricted to the science of predicting future events, especially the fortunes of men, from the positions of the heavenly bodies. This was considered the higher, the real science; while the mere knowledge of the stars themselves, their places and motions (astronomy), was, till a very recent period, cultivated mostly with a view to (judicial) astrology. Astrology is one of the most ancient forms of superstition, and is found prevailing among the nations of the East (Egyptians, Chaldeans, Hindus, Chinese) at the very dawn of history. The Jews became much addicted to it after the Captivity. It spread into the West and to Rome about the beginning of the Christian era. Astrologers played an important part at Rome, where they were called Chaldeans and 'mathematicians'; and though often banished by the Senate and emperors under pain of death, and otherwise persecuted, they continued to hold their ground. The Roman poet, Manilius, author of an astronomical poem still extant, was addicted to astrology; and even Ptolemy, the astronomer, did not escape the infection, which in his time had become universal. It accords well with the predestinarian doctrines of Mohammedanism, and was therefore cultivated with great ardor by the Arabs from the Seventh to the Thirteenth Century. Some of the early Christian Fathers argued against the doctrines of the earlier astrology, while others received them in a modified form; and indeed it formed part of the basis of their religion in the Gospel narrative of the visit to Bethlehem of the Wise Men from the East, who were Chaldean magi or astrologers. In its public capacity, the Church several times condemned the study as tending to fatalism, superstition, and unlawful prying into the future; but many zealous Catholics—even churchmen—have cultivated it. The Fourteenth and Fifteenth centuries were the palmy days of the science; chairs for its teaching were founded in the two oldest universities,—those of Bologna and Padua,—and no prince's court was complete without its official astrologer. After the Renaissance the study was vigorously opposed from diametrically opposite points of view—such as those of Savonarola and Pico della Mirandola. But for centuries the most learned men still remained devoted to its teachings, including among astronomers Cardan, Tycho Brahe, and Kepler; Wallenstein absolutely, and Napoleon partly, believed in it, though the frequent references of the latter to his 'star' seem to have been made largely for effect. Bacon maintained the reality of an underlying basis of truth at least, while discrediting the practitioners of his day. Burton and Sir Thomas Browne also retained a belief in its possibilities. William Lilly (q.v.) was the last astrologer in England who had any great public influence; he asserted and partly proved his wonderful success in foretelling both public and private events. But the acceptance of the Copernican system and new fashions in science tended to destroy the older beliefs; and by the following century the study had so far lost its hold that the merciless ridicule of Swift, applied to the unfortunate almanac-maker Partridge, was sufficient to discredit it. But believers in it are still found, even among educated men. In Germany J. M. Pfaff published a notable treatise in its favor entitled *Astrologie* (Bamberg, 1816). The natural tendency of the ignorant and credulous to seek for insight into the future has allowed a multitude of quacks to trade upon the name of astrology, and to give the impression that it is beneath contempt. It is well to point out, however, that the predictions of the better class of astrologers are not mere haphazard guesses, as is frequently supposed, but are based upon rigidly scientific determination from observed phenomena, according to definite rules of interpretation; and also that astrology lays no claim to absolute prediction of future events, undertaking merely to point out the direction which affairs are likely to take, other things being equal—according to the old saying: "*Astra regunt homines; sed regit astra Deus.*"

The ordinary method of applying judicial, or, as it is sometimes called, mundane, astrology to the decision of a question was to calculate the positions of the heavenly bodies either at the moment when the question was asked or at the birth of the 'querent.' Then the circle of the heavens was divided into twelve equal parts, six above and six below the horizon. These are the twelve 'houses,' through which the planets pass in their regular movements. The first house, that which lay in the east from 5° above the horizon to 25° below, called the ascendant, was considered of the most importance, as it contained that part of the heavens which was about to rise. The planet which was 'lord' of this house was usually taken as the 'significator' of the 'querent.' Each house, however, had one of the heavenly bodies as its lord, who was considered to be strongest in his own house. The first was called the house of life; the second, that of fortune or riches; the third, of brethren; the fourth, of relations; the fifth, of children; the sixth, of health; the seventh, of marriage; the eighth, of death; the ninth, of religion; the tenth, of dignities; the eleventh, of friends and benefactors; the twelfth, of enemies or of captivity. Besides the positions of the planets in the different houses, it was necessary to consider their position in relation to each other—in conjunction, in opposition, and so on through a variety of technical descriptions. Each planet was supposed to rule some special part of the world and of the human body, so that according to its position it might bring on certain conditions for the countries under its influence, and cause or avert certain diseases. Persons born under particular planets were believed to be endowed with temperamental characteristics corresponding to the nature of the planet. From this belief the epithets *mercurial, jovial, saturnine* have passed into common speech; in fact, a larger number of expressions than would be generally supposed come from astrology. *Disastrous* and its Saxon equivalent *ill-starred, ascendancy, consider*, are examples of words which are relics of this once universal belief; and many passages in our older writers are unintelligible without some knowledge of it.

The accompanying figure shows the positions of the planets at the time of the signing of the Declaration of Independence. According to astrological interpretation, the newly formed nation was destined to enjoy success in war and to develop an extensive commerce with every country of the earth, while fecundity and prosperity were to reign among its people.

Consult: Sibley, *A New and Complete Illustration of the Celestial Science of Astrology* (London, 1789); Butler, *Solar Biology* (5th ed., Applegate, Cal., 1892); Bennett, *Astrology* (New York, 1894); Maury, *La magie et l'astrologie à l'antiquité et au moyen âge* (4th ed., Paris, 1877); Meyer, *Handbuch der Astrologie* (Berlin, 1891).



AS'TRONOM'ICAL AND AS'TROPHYS'ICAL SOCI'ETY OF AMER'ICA. A national organization with membership limited to persons possessing technical attainments in astronomical and atrophysical science. The Society was founded in 1899.

ASTRON'OMY (Gk. ἄστρον, *astron*, star + νόμος, *nomos*, law). The oldest of the sciences. The early history of astronomy is perhaps more important than that of any other science; indeed, it may be said that a study of the state of scientific culture among the early peoples amounts to little more than an examination of their notions on astronomy. The science had its beginning with the Chaldeans and Chinese, working, of course, independently of each other. The former, according to Greek historians, were able to predict eclipses with considerable accuracy. The latter, in addition, were acquainted with certain elementary forms of the calendar, and have left authentic observations of eclipses, comets, etc., extending back at least a thousand years before our era.

Among the Greeks we find various names conspicuous at a very early date. Thus Thales (c.640-546 B.C.), Anaximander, Anaxagoras, Pythagoras (c.580-497 B.C.), Meton, and Eudoxus, are all mentioned by later writers as distinguished astronomers. They doubtless occupied themselves principally with eclipse and calendar investigations, and with imaginary systems of the universe based upon abstract speculation rather than accurate observation. The Alexandrian Greeks carried astronomy much further. Aristarchus (Third Century B.C.), and Eratosthenes made numerous rather difficult observations, and Hipparchus (Second Century B.C.) even constructed a fundamental catalogue of stars. Ptolemy (Second Century A.D.) wrote the *Almagest*, an important general treatise on astronomy, and was the inventor of the Epicyclic System of the Universe, which makes the sun and planets move in circles whose centres are themselves in motion upon other circles, the earth being considered at rest. See PTOLEMY; PTOLEMAIC SYSTEM; EPICYCLE; ECCENTRIC.

The Arabians also did much for astronomy. The most important names are those of Al Battani (c.900 A.D.) and Ulugh Beg, who lived about five centuries later. The latter constructed the second known catalogue of stars.

Modern European astronomy begins with Purbach and Regiomontanus in the Fifteenth Century. Copernicus (1473-1543) stands out conspicuously as the author of a system of the universe nearly the same as that now accepted. (See COPERNICAN SYSTEM.) Copernicus was followed by Tycho Brahe of Denmark (1546-1601), who left a most important collection of solar and planetary observations as well as a catalogue of 777 stars far superior in precision to those of Hipparchus and Ulugh Beg. It was upon a discussion of Tycho's observations that his famous pupil Kepler (1571-1630) built his well-known laws of planetary motion, which are now accepted, and which will be stated below. Galileo (1564-1642), one of the first constructors of the telescope, made with it unprecedented observations. To his gaze were first disclosed the moons of the planet Jupiter, and his clear mental vision saw in that planetary system a true miniature of our solar system itself—an ocular demonstration of the Copernican plan of the universe. To Galileo we owe also the discovery of the pendulum, perhaps the most important astronomical instrument. This was adapted to the astronomical clock by Huygens (1629-95), whereby observation in the modern sense was first rendered possible. For greater detail, see separate articles on each of the names here mentioned.

We come now to the great name of Newton (1642-1727). With him we may say that astronomy really begins; so that we can now substitute an account of the present state of the science for the historical outline thus far pursued. Newton's conception of the universe makes all phenomena of motion subject to a single law—the law of gravitation. (See GRAVITATION; FORCE; FALLING BODIES; PROJECTILES; NEWTON.) According to this, every material body attracts or draws every other material body. In every case the strength of the attraction increases as the mass of the attracting body, and diminishes as the square of the distance from the body attracted. It is possible by mathematical reasoning to prove from Newton's Law just how a system of planetary bodies would move under the influence of the attraction of some larger central sun. We thus find mathematically that such motion must follow these three laws: (1) Each planet must revolve in an elliptic orbit having the sun in its focus. (2) The straight line joining the sun and planet must pass over equal areas in equal times. (3) The square of the time of revolution of each planet must be proportional to the cube of its mean distance from the sun. Now, these are precisely the laws found by Kepler from the actual observations of Tycho Brahe. Newton's law of gravitation is therefore seen to lead by deduction to the general facts actually observed by astronomers, and hence the mechanical construction of the solar system in which we live may be regarded as fully explained by Newton. Later investigators have elaborated his theory and carried the mathematical explanation of visible phenomena down to the minutest precision attainable with the most powerful modern observational machinery. The work of Newton may be said to have been crowned by that of Laplace (1749-1827), who analytically demonstrated the stability of the solar system, and whose *Mécanique céleste* was a worthy successor to Newton's *Principia*. Having thus disposed of the mechanism of our solar system, the question suggests itself as to whether this same law of Newton holds sway even to the most distant confines of the visible universe. Does it control the motions of stars whose vast distance allows us barely to glimpse them in our largest telescopes? The answer in the present state of astronomical knowledge is not quite so certain for the distant stellar systems as it is within our immediate neighborhood in space. Yet we may say that observations so far made have brought to light no phenomena positively contradicting the universality of Newton's law.

THE SUN. Coming now to a closer inquiry into the details of our subject, we begin with the sun (q.v.), the central body of our own system. (See SOLAR SYSTEM.) From a terrestrial point of view, being the source of our light and heat, the sun is certainly the most important of all the heavenly bodies. But considered as a cosmic body the sun is simply a blazing star, and not even a very great one as compared with the average of all the stars. Numerous theories as to its constitution have been advanced. The best authorities now agree that whatever may be the unknown structure of the central mass, the surface layer directly visible to us (the 'photosphere') consists of brightly incandescent matter, partly liquid or even solid, and giving out the sun's light. Outside of this is a truly gaseous layer (the 'chromosphere'), very hot, bubbling, boiling, and at times throwing jets of luminous vapor hundreds of thousands of miles into space. Beyond the chromosphere extends another envelope of tenuous matter (the corona, q.v.), so slightly luminous that it can be seen only when a total eclipse shuts out altogether the stronger light of the photosphere. The most conspicuous phenomena upon the photosphere are the sunspots. These are great temporary breaks or openings, sometimes a hundred thousand miles in diameter. They look like the effects of storms or explosions. Their cause is not definitely known, but it has been found that magnetic storms on the earth usually occur at periods of great spot-frequency on the sun. No connection with the weather or other terrestrial phenomena has, however, been demonstrated.

Solar chemistry has been studied by means of an instrument called the spectroscope (q.v.) (see SPECTROSCOPY), which enables us to determine the chemical constituents of a luminous body like the sun. The conclusion reached is that the sun contains no chemical elements other than those found on the earth, a fact of great interest in connection with the question of a possible common origin for the whole solar system. One of the most interesting questions in connection with the sun is the probable source of its great and continuing heat. Why does it not become completely consumed as a result of continuous combustion? This question was answered by Helmholtz (q.v.), who showed that the energy required to generate the sun's heat could be derived from a gradual contraction or shrinkage of its bulk. So great is this bulk that a contraction sufficient to produce the heat in question might go on for ten thousand years without producing a diminution in the sun's apparent diameter large enough to be perceived even by our greatest telescopes.

THE EARTH. From the standpoint of the astronomer, the earth is merely one of the smaller planets of the solar system. Still, since observations of the heavens can be made only from its surface, it acquires special importance even from the purely astronomical point of view. It was recognized in the very earliest days of science that a study of the earth's dimensions is fundamental to exact astronomy. When we try to make actual measurements on the sky we are confronted by this remarkable limitation: our instruments enable us to measure the *directions* of the heavenly bodies, but not their *distances*. This obvious fact is seldom set forth with sufficient emphasis. A knowledge of distances in the heavens can be attained only by calculation from measurements of differences of direction combined with some terrestrial base-line. To make this base-line as large as possible, it is necessary to use as near as may be an entire diameter of the earth. For this reason the earth has been most carefully measured, and it has been found that its general shape is that of a flattened sphere having an average diameter of about 7918 miles, the difference between the greatest and least diameters being about 27 miles. Yet the very latest researches of modern investigators tend to show that the earth diverges from the regular form of a flattened sphere by measurable amounts. The name *geoid* has been invented to describe its exact mathematical figure. (See EARTH; GEODESY; TRIANGULATION.)

The earth revolves on its axis uniformly; and the quantity of time required for one complete revolution has been adopted as the fundamental unit for measuring time in astronomy. This unit interval is called the *sidereal day*. (See DAY.) It is of course important in the highest degree that all natural units of measure be absolutely invariable in magnitude. And it has been ascertained from a comparison of ancient and modern eclipse observations that this necessary condition of constancy is fully satisfied by the day as a unit of time. The axial rotation of the earth is the cause of the sun's, moon's, and stars' rising and setting. For as the earth turns on its axis, carrying the observer with it, of course the heavenly bodies seem to be carried past in the opposite direction. This is much like the apparent spinning by of houses and fields to an observer in a rapidly moving railway train. These apparent phenomena arising from axial rotation are called *diurnal* phenomena. In addition to its axial rotation, the earth travels around the sun once in a year, pursuing, like the other planets, an oval or elliptic orbit in obedience to Kepler's Law. It happens that the gravitational forces controlling the earth's motions are so adjusted that its rotation axis maintains a nearly constant direction in space. As this axis makes an angle of 23½ degrees with the plane containing the annual orbit around the sun, it follows that for any given place on the earth's surface the rotation axis is turned sometimes toward the sun and at other times away from it. This gives rise to the phenomena of the seasons. Of all astronomical occurrences, the diurnal phenomena and the seasons are the ones most closely affecting our daily life.

THE MOON travels around the earth with an orbital motion quite analogous to that of the earth around the sun, only that the moon completes its revolution in about 29½ days instead of about 365 days, as in the solar revolution of the earth. It is this orbital motion that causes the moon, from night to night, to appear in a different position among the stars. Indeed, to complete an entire circuit in so short a period, it is necessary for the moon to have a daily motion of about 13° among the stars. The moon also has a revolution about its own axis of figure, analogous to the earth's diurnal revolution already described. But, curiously enough, the time required for one axial revolution of the moon is exactly equal to the period of its orbital revolution around the earth. The consequence is that the moon always turns the same side toward us, and we never have an opportunity of studying the details of the opposite side. It is not a self-luminous body like the sun. The surface simply reflects solar light to us. It is easy to understand that though the sun may be below an observer's horizon, and therefore invisible to him, yet solar light may travel past the earth to the moon, and be thence reflected back to the observer. Thus the moon appears bright, even though the sun is invisible. Indeed, it is only when the sun is below the horizon that the moon has great brilliancy; for when both are visible at the same time, the solar daylight makes the moon quite dim by comparison.

The phases (q.v.) of the moon are perhaps the most conspicuous phenomena connected with that body. It is clear that since the moon owes its luminosity altogether to light received from the sun, only one-half its surface will be illuminated at any one time. This would appear as a complete circle of light in a direct view, but if seen from one side will be foreshortened. We thus see at times the half-circle we call the first or third quarter, and at other times the sickle called the new moon. Absolutely no connection whatever exists between weather on the earth and the changes of the moon's phases. The appearance of the moon's surface in the telescope is much like the earth's would be, if seen by an equally distant observer. The most conspicuous features seem to be volcanic mountain ranges with peculiarly large craters. Often great surface-cracks seem to radiate from these craters in all directions.

The moon is the principal cause of the tides (q.v.) that are observed every day along the ocean borders of the earth. According to the law of gravitation, the moon attracts both the water and the solid earth. But as the force of attraction diminishes rapidly with distance, of course the moon pulls the water on the side of the earth facing it more strongly than it does the solid earth underneath. Still less strongly does it pull the water on the opposite side of the earth. The result is that the moon tends to heap up the water on the side of the earth nearest to it by pulling the water as it were away from the earth. But it also, though in a lesser degree, heaps up water on the opposite side of the earth, in a measure pulling the earth away from the water. Then, as the earth revolves on its axis every day, these two great tidal waves follow the moon, ever tending to be highest at the point of the earth directly facing the moon, and again at the point diametrically opposite. Thus every day there are two high tides, and two corresponding low tides. The attraction of the sun has a similar tidal effect, though in a far smaller degree, on account of the much greater distance of the earth from the sun. It sometimes happens that the tidal influences of the sun and moon work together. At such times we get our greatest tides. When, on the other hand, these two tide-making bodies are so placed as to work against each other, we get our minimum tides on the earth.

Another of the most interesting astronomical phenomena depending on the moon is the eclipse (q.v.). It sometimes happens that in its orbital motion about the earth, the moon gets directly in line between the earth and the sun. In such a case, the light of the sun will be either partially or totally cut off, giving what we call a solar eclipse. Again, the moon may be in line with the earth and sun, but in such a way that the earth is between the two other bodies. In that case no solar light can reach the moon, to be reflected to the earth. The moon is therefore dark, and we call the phenomenon a lunar eclipse. Of the two, the solar eclipse is by far the more interesting and important scientifically. This is true especially of the total solar eclipse, which for any given place on the earth is a very rare phenomenon indeed. It is only during a total eclipse that we can see the solar corona, which is perhaps the most beautiful and grandest spectacle in Nature, and at the same time one of her deepest mysteries.

MERCURY and VENUS have orbits entirely within that of the earth. Mercury is nearest to the sun of all the known planets, and it is also the least in size. Since its linear distance from the sun is so small, it always appears to our view near the sun on the sky. It is therefore usually very difficult to see, on account of the bright solar light, being visible only in the twilight preceding sunrise and immediately following sunset. Venus, the other interior planet, is about the same size as the earth, and, like the earth, is surrounded by an atmosphere. Both Mercury and Venus exhibit phases similar to the moon's, and these may be observed easily in the telescope.

MARS. Outside of the earth, the next planet in order of distance from the sun is Mars. It has two satellites, or moons, which are so extremely small that they can be seen only in the most powerful telescopes. Mars has attracted much attention of late years, on account of the extensive observations of its surface markings that have been made by various astronomers, notably Schiaparelli and Lowell. Details of great interest have been brought to light, but at the present time they are still subjects of controversy on account of the inability of other skilled observers to verify them.

THE ASTEROIDS form a group of some four or five hundred tiny planets moving with one exception in orbits entirely beyond that of Mars. Their exact size is not known, but it is most probable that the largest of them does not exceed 400 miles in diameter, and the smaller ones are probably no greater than 10 miles. We cannot state positively what may bave been their origin. Perhaps some larger planet has broken up into these planetary fragments, or possibly they are fragments that should, in the remote ages of the beginning of the solar system, have coalesced into a planet of ordinary size. If such has been the manner of formation of the larger planets, we cannot know the exceptional causes that operated to prevent the more usual result in the present instance. Our knowledge of the existence of the asteroids dates back only to the beginning of the Nineteenth Century, the first of them, Ceres, having been discovered in 1801.

JUPITER, the giant planet of our system, is nearly eleven times as large in diameter as the earth. So very far away is it that the earth's orbit shrinks almost into insignificance by comparison. It follows that there is never any sensible foreshortening in our view of Jupiter, nor does it exhibit any phases like the moon or closer planets. Jupiter has no less than five satellites. Four of these are of quite conspicuous magnitude, and visible easily in the smallest telescope. Indeed, they were discovered, as we have already seen, by Galileo, the first time he ever turned to the heavens the telescope he had invented. The fifth is a very tiny one, so close to the planet that it can be distinguished only with the greatest difficulty. It was discovered by Barnard in 1892 at the Lick Observatory. These satellites present a great variety of interesting phenomena. At times one or another is eclipsed, on account of the planet being between the satellite and the sun. They then rather suddenly disappear from our view. At other times, they become invisible by going behind the planet as seen from the earth. Again, sometimes they pass between the planet and the sun, so that we can see quite plainly the satellite's shadow projected as a black dot on the planet's visible disk. In the telescope, Jupiter shows truly astonishing surface markings. It would appear as though it possesses a great atmosphere with floating clouds of varying shapes and colors. It has an axial rotation which is completed once in about ten hours, so that the rotation alone is rapid enough to give ever changeable views of the visible surface to the observer.

SATURN, the last of the planets known to the ancients, is still farther away from the sun. It has no less than eight moons, all of which were discovered before 1850. But decidedly the most interesting feature of its system is the bright detached ring that encircles the ball of the planet. It was first discovered by Huygens in 1655, but only in our own day has it been shown by the mathematical researches of Maxwell in England and the spectroscopic observations of Keeler in our own country that the ring is really a mass of small detached satellites, not without analogy to the belt of asteroids encircling the sun.

URANUS and NEPTUNE are the two remaining planets. Uranus was discovered by William Herschel in 1781. It is an inconspicuous object on account of its immense distance, though it has four small satellites that just admit of being seen in a telescope of good size. The most interesting thing about Uranus is that it led to the discovery in 1846 of the new planet Neptune, from a mathematical consideration of the small perturbations of the orbit of Uranus by the latter planet. This discovery is regarded as the greatest triumph ever attained by mathematical science. The honor was shared equally by Leverrier of France and Adams of England.

COMETS. In addition to the planets, the solar system also contains certain somewhat erratic bodies called comets (q.v.). Nothing definite is known as to their origin or physical constitution; but it is certain that they move, under the influence of gravitation, in orbits that admit of calculation by the aid of Newton's and Kepler's laws. In appearance they vary greatly. At times the comet is but a trace of thin, filmy haze on the sky, so tenuous that it can barely be glimpsed in the telescope, and allowing the stars to be seen easily through it on the background of the sky. At other times, the comet is a magnificent object, very conspicuous to the naked eye, and perhaps spreading its tail over a large part of the celestial vault. Such large comets in ancient times were usually looked upon with superstitious fear. In our day little of this remains, except that the possibility of actual collision with the earth is often the subject of inquiry when new comets appear. It may be said with confidence that the inherent probability of such a collision is so small as to be practically *nil*. And even if a collision were imminent, we might look forward to it without apprehension, so far as our present knowledge of comets enables us to form an opinion. Sometimes comets are seen to divide into parts, and there is good reason to suppose that they occasionally become completely disintegrated, subsequently changing into swarms of small particles, perhaps in most cases no bigger than the head of a pin. When the earth passes through such a swarm, friction with our atmosphere heats the particles until they become incandescent. They are then plainly visible as meteors, and even quite large ones have at times been found actually to fall upon the earth's surface. See METEORS.

THE STARS. Far beyond the confines of the solar system, and, indeed, at a distance almost inconceivably great, is situated the universe of stars (q.v.). According to the accepted theory these stars, which to us appear merely as points of light, are really great blazing suns, in many cases, doubtless, attended by systems of planets analogous to our own. From the earliest ages it has been the custom, for purposes of classification, to divide the stars into the so-called constellations (q.v.). These are purely arbitrary subdivisions of the surface of the celestial vault, and are supposed to represent usually some mythological personage or fantastic animal. Exact science has substituted for the constellations, carefully made catalogues of the stars, in which their precise positions are set down much in the same manner as, on the earth, latitude and longitude are used to define the positions of various places. The stars are usually called 'fixed stars.' It is known, however, that they are not really immovable, but are in continuous motion through space in orbits so vast that we have as yet been unable to do more than guess at their dimensions. Even the sun, regarded as a star, is known to be moving through space toward a point in the constellation Hercules with a velocity of about 16 miles per second. The whole solar system of course partakes of this motion.

Many attempts have been made to measure the distances of the stars. But as we can actually observe only their directions in space, the sole method open to us is to note whether such directions suffer any change when the earth is situated at opposite sides of its orbit around the sun. In other words, we employ the diameter of the earth's orbit as a sort of base-line. And though this base-line is 185,000,000 miles long, so great are the stellar distances that no star has yet been found for which this great orbit diameter subtends an angle greater than about one second of arc. (See PARALLAX.) With reference to their brilliancy, the stars have been classified in groups, and the term magnitude has been used to designate brilliancy. Thus a star of the first magnitude means one whose light is so brilliant as to place it among, say, the twenty brightest stars. Of course, the number of stars of each magnitude increases very rapidly as we come to the classes of lower brilliancy. Strangely enough, the magnitudes of the stars are not constant. There is, for instance, one star in the constellation Argo that has diminished so much in brightness that it is at present no longer visible to the naked eye, though about the middle of the past century it was at least the equal of any star in the sky. To this class of variable stars belong also the 'temporary stars,' which blaze up now and then like a great conflagration, only again to subside into invisibility after a short time. The chemical composition of all these stars admits, like that of the sun, of being studied to a certain extent by means of a spectroscope. It is found that the stars are probably composed of the same elements that go to make up the sun and the earth.

Frequently we find a couple of stars very close together on the sky. Indeed, often they are so near that the eye fails to distinguish them, and it requires a powerful telescope to separate their light. It was thought at first that these double stars (see DOUBLE STARS) were accidental merely, and that while the two stars had nearly the same direction in space, they might nevertheless be separated by an immense linear distance. But it has been found that some such doubles are true *binaries*, showing an orbital revolution about the common centre of gravity of the two component stars. Sometimes such stellar systems have three or more components. Even entire clusters may have a physical connection within themselves, and it is not improbable that the forces of gravitational attraction compel and control the complex movements of such aggregations of stars, just as they do the lesser intricacies of our own solar system. A magnificent field for speculation is opened by a consideration of the vast possibilities of such mighty stellar groups—true universes within the universe.

NEBULÆ. In addition to the stellar systems, we have in the sky another interesting class of objects, the nebulæ (q.v.). These appear in the telescope as hazy clouds of light, usually condensing here and there into brighter nuclei. It is impossible to escape the conviction that these nebulæ are gaseous, and that they furnish a sort of key to the life history of the ordinary stars. Indeed, spectroscopic evidence tends to show that many of the nebulæ are composed of matter in the form of incandescent gas. What, then, can be more plausible than to see in the stars the result of a gradual process of cooling in nebulous matter? One can imagine readily that condensation and contraction might result in the formation of a single central sun, or that there might be two or more such centres. Indeed, the sky actually does show some cases of 'double nebulæ.' Recent mathematical researches have indicated that the tidal effects seen on a small scale in the case of the earth and moon would play a much more important part in double nebulæ while still in the plastic condition. The mighty cosmic tides that would there be set up might undoubtedly produce perturbations great enough to account for the most complete changes in the character of motion within the system. An account of this study of the past and future history of cosmic systems may be found in the article COSMOGONY.

BIBLIOGRAPHY. The following books will be found useful in a more detailed study of the science of astronomy:

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AS'TROPHEL. The name under which Sir Philip Sidney disguised his identity in writing the sonnets to "Stella," 1575-83. These poems appeared in 1591, and are considered the author's most remarkable achievement. Also the title of Spenser's elegy on Sidney.

AS'TRO-PHOTOG'RAPHY (Gk. ἄστρον, *astron*, star + *photography*). In no department of astronomy has development in recent years been so marked as in the application of photographic processes of observation. If photography could accomplish nothing more than what it has done and is doing for descriptive astronomy alone, we should still rank it among the most powerful weapons in the armory of the astronomer. It is but necessary, for instance, to examine a series of eye and hand drawings of some total eclipse, executed by different skilled observers at the same time, to come at once to the conclusion that it is well-nigh impossible to obtain correct information in this way; even the outlines of the corona and prominences will sometimes differ so greatly that one would scarcely believe an attempt had been made to delineate the same objects. Photography, of course, gives us a far more faithful picture, and thus furnishes observational material of specially high value. But even more important, perhaps, are the services it is capable of rendering to the astronomy of precise measurement, and photographic processes seem to be destined to replace the less facile visual methods which were employed exclusively until a few years ago. The heliometer (q.v.) is generally known as the most exact instrument for executing measurements on the sky. Yet, in the opinion of some of the highest authorities, the equality of photographic results with those of the heliometer may now be considered as conclusively demonstrated. The year 1892 saw the first complete publication of an extensive series of results. These were derived from excellent photographs of the cluster Pleiades, made in 1872 and 1873 by Rutherfurd, in New York. These results have been followed in the last few years by many other star-cluster measures, so that an extensive mass of material is being gathered by photography—material of the highest precision and of the last importance in stellar astronomy.

It is only by a study of minute inter-stellar changes in the star-clusters that we may hope, within the limits of human time, to throw some light upon the problems of motion within the greater universe that lies beyond our own solar system; and it is to photography that we must look for our observational material. Generalizations of science can be secured only by the discussion of very large masses of observations; but although the heliometer can give us sufficient precision, it involves so much labor that by its exclusive use astronomy could not hope to do more than touch the surface of those great problems.

An account of the immense advances made, since the introduction of photography, in our knowledge of planetoids is given in a special article concerning these bodies. Suffice it to mention here that the photographic revelations in this important field have culminated in the discovery of the planet Eros (q.v.), now known to be, with the exception of the moon, our nearest neighbor in space. Many comets, too, have been discovered, and many doubtless will be discovered with the aid of photography; and it is photography again that furnishes the means of determining their positions and measuring their orbits with greater facility than could be obtained by any other method at present known. There is no doubt, further, that photography will greatly increase the list of known distances between the earth and remote heavenly bodies (see PARALLAX), and that before many years it will replace the eye even in noting the instant of a star's transit across the meridian of an observatory. See TRANSIT INSTRUMENT.

But decidedly the most complete triumph of astro-photography is Gill and Kapteyn's Cape of Good Hope photographic *Durchmusterung*, the results of which are comprised in a remarkably complete catalogue of the southern heavens. In the year 1882, a very bright comet appeared in the sky, and was especially conspicuous in the Southern Hemisphere. Its brightness led Gill, at the Cape of Good Hope Observatory, to attempt to photograph it. Having no special photographic apparatus, he called to his aid a neighboring portrait photographer named Allis. An ordinary portrait camera was employed by them, and, for convenience in mounting, it was simply strapped to the tube of a visual telescope in the observatory. With this apparatus they obtained what is believed to be, in all probability, the earliest successful photograph of a comet. In examining the negative, Gill's attention was attracted to the large number of stars appearing on the plate as minute points or dots, and it was these that first suggested to him the possibility of making a complete examination of the heavens with the aid of photography.

The German term *Durchmusterung*, now naturalized in scientific English, was first applied to Argelander's (q.v.) great catalogue of stars in the northern half of the sky, a work which has rendered possible many statistical and other researches of far-reaching importance in stellar astronomy. But Argelander and his successor, Schönfeld, observing at Bonn, in Germany, were able to carry on their survey only a short way beyond the northern half of the sky. Gill, in his observatory at the Cape of Good Hope, far south of the equator, saw the possibility of extending Argelander's work, by means of photography, to the South Pole. To have so extended it by the visual methods that were used by Argelander would have required an enormous expenditure of time and labor; but a small photographic telescope was procured, and, in the hands of C. Ray Woods, a scientific photographer who was summoned from England, a complete collection of plates of the southern sky was made. The negatives were sent to Groningen, Holland, and were there measured by Kapteyn. The resulting catalogue, published in three large volumes by the British Government, is found to possess even greater completeness than Argelander's; for the fallible human eye could not avoid omitting a star now and then, while the photographic plate is of course subject to no such error.

The Cape Durchmusterung is, however, not the only great result to which Gill's 1882 comet photograph has led. The Durchmusterung was carried out much on the same lines as Argelander's older work in the Northern Hemisphere, the idea being to make a census of all the stars in the sky down to a given magnitude, even if it should be impossible to give more than a rough approximation of their positions in the sky. But the success of the first enterprise led Gill to conceive the idea of preparing a new star catalogue that should satisfy the condition of high precision as well as that of completeness as to numbers. So vast an undertaking could be rendered possible only by the combined efforts of many astronomers and many observations, and, as the result of preliminary correspondence, a meeting to consider the subject was called at Paris by the French Government in 1887. Delegates from all the civilized nations attended, and it was decided that the proposed photographic catalogue of precision should really be made, that it might stand for all time as the foundation of research in sidereal astronomy. Eighteen observatories have since been engaged in carrying out this astronomical enterprise, the greatest the world has ever seen. To make error of any kind practically impossible, the photographs are taken in duplicate, the total number of plates required being 44,108, each representing a surface of four square degrees. All stars down to the eleventh magnitude, numbering about 2,000,000, will thus be subjected to precise measurement. A further series of plates is being made for the myriads of stars of still lower brilliancy. But as their precise measurement would involve an amount of labor surpassing the possibilities even of elaborate governmental coöperation, they will be merely reproduced in charts for the use of astronomers who may need them in their special researches.

We have already called special attention to the pioneering work of Rutherfurd in the photography of stellar clusters, etc. It may be of interest also to mention some other American astronomers who have distinguished themselves in the new methods of observation. Probably the first really successful celestial photograph was made in 1840 by Draper. He was able to obtain negatives of the moon, showing the principal formations of her surface. Ten years later, in 1850, Bond and Whipple made still better moon pictures at Harvard College, Cambridge, Mass. Coming down to more recent years, we find among American photographic astronomers, Pickering, who has done much in the photography of stellar spectra and in other departments of astro-physical photography; Hale, who has succeeded in photographing the solar prominences and faculæ in full sunlight; and Campbell, who has determined photographically the velocities of motion in many of the stellar systems.

More detailed information on the subject of astro-photography may be found in the *Bulletin du comité permanent de la carte du ciel* (Paris, Institut de France, Vols. I. and II.), and in Scheimer's *Photographie der Gestirne* (Leipzig, 1898).

ASTRUC, ás'trụk', Jean (1684-1766). A distinguished physician. He was born at Sauves, in Languedoc, March 19, 1684. He studied at Montpellier, where he took his degree as doctor in 1703. In 1710 he was appointed to a professorship at Toulouse, and in 1716 he was called to a chair in medicine at Montpellier. In 1729 he became physician to the King of Poland, but the next year accepted a chair at Paris, where he died on May 5, 1766. His most important works are his dissertations on the epidemic diseases, published at the time of the plague (1722 to 1725); his great work on venereal diseases (*De Morbis Venereis*), that appeared at Paris in 1736; and his epoch-making *Conjectures sur les mémoires originaux dont il paraît que Moïse s'est servi pour composer le livre de la Genèse* (Brussels, 1753). The last book was written in the apologetic interest of curing what the author called 'the malady of the century'—the doubt as to the Mosaic authorship of the Pentateuch. It furnished the clue to the documentary analysis of this work by calling attention to the fact that in the Hebrew text of Genesis the name for God is sometimes Elohim and sometimes Yahweh, and that the Elohistic passages differ in fundamental conceptions from the Yahwistic. This showed that Moses had used different sources in compiling Genesis.

AS'TRUP, Eivind (1870-96). A Norwegian explorer; born at Christiania. He came to America in 1891, and in the same year joined the Peary expedition to Greenland. In 1893-94 he was a member of the second Peary expedition to Greenland, and made the first survey of the northern and northeastern coast of Melville Bay. He lost his life during a snowshoe expedition from Dovre, Norway. His body was found January 21, 1896, at Lille Elvedălen. His published works include *Blandt Nordpolens Naboer* (1895).

ASTURIAS, ȧs-tōō'rĭ-ȧs (from Basque *asta*, rock + *ura*, river; literally 'the country of the dwellers by the rocky river'). A former division of Spain, now included in the Province of Oviedo, bounded on the north by the Bay of Biscay, east by Santander, south by León, and west by Galicia. The low hills of León and Old Castile rise gradually to the mountain chain which forms the southern boundary, towering to a height of nearly 9000 feet in the summit of Torre de Cerredo. The northern slopes are broken by steep and dark valleys or chasms, which are among the wildest and most picturesque in Spain. The climate is damp, as the clouds and fogs of the Atlantic hang continually about the snow-capped mountains. The principal kinds of wood are oak, chestnut, and silver and Scotch firs; in the more remote districts the forests are superb. Pasturage is found along the slopes in the narrow valleys, supporting an excellent breed of horses and cattle. In the wider valleys, barley, wheat, maize, figs, olives, grapes, and oranges are cultivated; along the coast are excellent fisheries. Copper, iron, lead, cobalt, arsenic, antimony, and coal are found in the province.

Asturias became a place of refuge for the Goths in the Eighth Century. Here the famous Pelayo was made king in 718, and his successors, continuing the fight against the Arabs, became kings of León in the Tenth Century. The Asturians still boast of their independence as free Hidalgos and are simple in manners and brave; but less industrious and sociable than their neighbors in Biscay and Galicia. They have been termed the Swiss of Spain, and they are equally faithful and fond of money. The Vaqueros form a distinct caste in the province, intermarrying among themselves and leading a nomadic life, wintering on the seacoast and summering on the hills of Leytariegos. Oviedo, the capital, has, since 1833, given its name to the whole province. The other important towns are the ports of Gijon and Aviles. The area of the Province of Oviedo is 4091 square miles, with a population in 1897 of 612,663.

The eldest son of the Spanish King bears the title of Prince of Asturias.

ASTY'AGES (Gk. 'Αστυάγης, in the Babylonian inscriptions called *Isturēg*). The last king of Media, son and successor of Cyaxares, reigned c.584-550 B.C. According to the story told by Herodotus, Astyages, on account of a dream, gave his daughter Mandane in marriage to Cambyses, a Persian of eminence; but later, being influenced by an alarming dream, he sent Harpagus to destroy the child which was the fruit of the marriage. But the child Cyrus (q.v.) was hidden away by a shepherd, and was after many years brought to the notice of Astyages, who easily discovered the boy's parentage. Astyages punished Harpagus for deceiving him, and Harpagus instigated the bold and ambitious Cyrus to lead a revolt of the Persians, through which Astyages was made prisoner, and Cyrus took the sceptre. Astyages was treated mildly, but kept a prisoner until his death. According to the more reliable account given in the Babylonian inscriptions of Nabonidus, Cyrus, the king of Anzan, revolted against his lord, Astyages. The troops of Astyages deserted him and delivered him to Cyrus, who captured Ecbatana in B.C. 550.

ASTY'ANAX (Gk., lord of the city, from *ἄστυ*, *asty*, city + *ἄναξ*, *anax*, ruler, lord). The son of Hector and Andromache, deported with his mother from the ruins of Troy by Pyrrhus. Upon the fortunes of these two Trojans, Racine has founded his admirable tragedy, *Andromaque*. At the death of Pyrrhus, Astyanax became king of Epirus. According to another legend, he was hurled from the walls of Troy, in fulfillment of an oracle.

ASUNCION, ȧ-sōōn'thē-ōn, NUESTRA SEÑORA DE LA, nwȧ'-strȧ sȧ-nyō'-rȧ dȧ lȧ. The capital of Paraguay, an episcopal city, situated on the east bank of the Paraguay River (Map: Paraguay, F 9). The city was founded in 1536, on the feast-day of the Assumption of the Virgin (August 15), and for more than a century was the capital of all the Spanish territory in the valley of the Rio de la Plata. There are a cathedral, several other churches, a government palace, a public library, a national college, and an agricultural school. The regularity of its streets and its fine situation on the river bank make it notable among South American cities. A railway connects it with various points, and a line of steamers with Buenos Ayres. It is the chief centre of trade for the entire country, and has a considerable commerce, the principal articles of export being leather, tobacco, sugar, and *yerba maté*, or Paraguay tea. Population, 1895, 45,000; 1900, 51,700.

ASUR, ä'sōōr. See ASSYRIA.

ASURBANIPAL, ä'sōōr-bä'nē-pȧl. See SARDANAPALUS; ASSYRIA.

ASURNAZIRPAL, ä'sōōr-nä'zēr-pȧl (Assyr. *aśur-naçir-pal*, "Asshur is the protector of the son.") King of Assyria from B.C. 885 to 860. He extended the Empire westward to the Mediterranean, and made Phœnicia, Sidon, Tyre, and Byblos tributary to his sway, restoring the Empire from Lebanon to the Tigris, as it had existed under Tiglathpileser. The principal historical sources concerning Asurnazirpal, consisting of stone inscriptions, a monolith, an obelisk, and a tablet of alabaster, are now in the British Museum. A record of his achievements is given in the so-called 'Standard Inscription,' of which more than 100 copies have been made, scattered throughout the principal museums of Europe and America.

ĀSVAGHŌSHA, ȧsh'vȧ-g'hō'shȧ, or **ĀÇVAGHOSA**. A Buddhist monk, author of a life of the Buddha, written in Sanskrit, and entitled *Buddha-carita*, or "Acts of the Buddha." He lived in the Second or the Fourth Century A.D., and his poetical work on the legend of Buddha follows the manner of a classical Sanskrit epic, but is written with the elaboration and artificiality of the later court poetry. It was translated into Chinese between A.D. 414 and 421. For the Sanskrit edition consult Cowell, *Açvaghosha's Buddha-carita* (Oxford, 1893); and *Sacred Books of the East*, Vol. XLIX.; and on the Chinese version consult Asvaghosha, *Discourse on the Awakening of Faith*, translated by Suzuki (Chicago, 1900).

ĀSVĀLAYANA, or **ĀÇVALAYANA**, äsh'-vȧ-lä'yȧ-nȧ. The name of an ancient Sanskrit author, familiar in connection with Vedic literature, because of the Srauta-Sūtra and the Grhya-Sūtra, which bear his name. See VEDA.

ASVAMEDHA, äs'vȧ-mād'hȧ (horse-sacrifice). A Vedic and later Hindu rite, believed to be efficacious in insuring progeny. The sacrifice was performed only by kings.

ASVINS, äs'vĭnz. Two Vedic divinities of the heaven, the Aryan Dioscuroi, later called Dasra and Nasatya. They are the first bringers of light in the morning sky, and the husbands of Surya, daughter of the sun god. The Asvins are the divine physicians, and are frequently implored in the Rigveda, where they are always addressed together for release from ills of all kinds.

ASWAIL, ăs'wāl. See HONEY-BEAR; BEAR.

ASWAN, ȧ-swän'. See ASSUAN.

ASY'LUM (Lat., Gk. *ἄσυλον*, *asylon*, right of sanctuary, refuge, a place safe from violence, from *ἀ*, *a* priv. + *σύλη*, *sylē*, right of seizure). A place of refuge. In ancient times, sacred places, especially the temples and altars of the gods, were appointed as asylums to which criminals as well as persecuted individuals might flee for refuge, and to molest them in such places was regarded as an impiety. An analogous institution is the 'cities of refuge' (Num. xxxv. 9-34). Among the Greeks in early times these asylums might be sometimes useful in preventing hasty retribution; but in the course of time they were so much abused that their sanctity was in a great measure disregarded. Thus Pausanias, who fled to the altar of Athene, was taken and slain there by the Lacedæmonians, and in other cases the refugee was compelled to leave the asylum by fire or starvation. In Rome, the Emperor Tiberius abolished all such places of refuge from law, excepting those in the temples of Juno and Æsculapius. The custom of allowing to real or supposed criminals a place of safety in temples was also adopted by the Christian Church. In the time of Constantine the Great, the churches were made asylums; and Theodosius II. extended the privilege to all courts, alleys, gardens, and houses belonging to the Church. In A.D. 681 the Synod of Toledo extended the privilege of asylum to a space of 30 paces around every church. In the lawless periods of the Middle Ages, the influence of the Church often prevented deeds of gross injustice and violence; but the sanctity of churches was abused by criminals, and this led to several modifications which gradually destroyed the privilege of sanctuary (q.v.). In England it was abolished by acts passed in 1534 and 1697. The word asylum is now applied to places of shelter for unfortunate or destitute persons, and especially to hospitals for the insane. See LUNACY.

ASYLUM, RIGHT OF. In international law, a privilege accorded by the law of nations or by custom to foreign legations to shelter within their precincts persons subject to the jurisdiction of the State in which such legation is maintained. As this definition indicates, the right, so far as it exists at all, is a right to *extend* protection, not to *claim* it; and this circumstance differentiates it strikingly from the institution of asylum or sanctuary (q.v.) as practiced in primitive society. (See Asylum, above; and also Avenger of Blood; City of Refuge.)

The right of asylum originated in the fiction of extra-territoriality (q.v.), or the extension by a State of its territorial jurisdiction by its legations into the territory of another State, to the exclusion, so far as the precincts of the legation were concerned, of the domestic jurisdiction. The person taking refuge within the legation was deemed to have come under the protection of its flag, and, so long as he remained there, to be as completely exempt from the legal or executive process of the country as if he had escaped to the foreign territory represented by the legation. He might be surrendered by the Government under whose flag he had taken refuge, at its pleasure, or as the subject of extradition (q.v.) proceedings; but any attempt to take him by force was an invasion of the territory of the State in whose legation he was sheltered. This is the theory upon which the alleged right of asylum rests, but it is a theory so clearly at variance with the real basis of international relations of independent States, and it has been so discredited by the abuses to which its application has led, that it has completely broken down. The fiction of extra-territoriality having been abandoned, attempts have been made to justify the right of asylum by the doctrine of the inviolability (q.v.) of diplomatic agents (q.v.), the members of their families, their official houses and property. But, in practice as well as in theory, this doctrine, which is intended only to guarantee the perfect freedom and fearlessness of the minister in the discharge of his functions as the representative of a foreign government, is strictly applicable only to the *bona-fide* members of his household, not to visitors, and still less to strangers temporarily residing with him.

Notwithstanding the absence in international law of any justification of the right of asylum, it has been frequently granted in modern times, but only in countries whose civil institutions fail to command the respect of foreign States, and in times of civil tumult. It was repeatedly practiced by the representatives of the Powers in Greece during the Revolution of 1862, and in Spain in the periods of anarchy between 1840 and 1850, and from 1865 to 1875. In the Spanish-American States it has been a common and recognized practice to protect in the legations the successive victims of the frequent revolutions by which changes in administration are commonly effected, and the legitimacy of the practice has not infrequently been acquiesced in by the State in which it occurred. This condition of affairs has given a certain legal sanction to the right of asylum in those countries, though it is usually justified by the States exercising it, not on legal grounds, but upon grounds of humanity. It is, however, universally conceded that it has no application to ordinary criminals, but only, as a measure of temporary protection, to political offenders. Even in this restricted form the practice has been generally discouraged and forbidden by the United States Government, though the grant of asylum by our ministers in Central and South America has in exceptional cases been condoned or approved by the Department of State.

The following rules, formulated by Prof. John Bassett Moore, may be taken to represent the official, if not the consistent, attitude of our Government:

1. In no case is a minister to offer his dwelling as a resort for refugees.

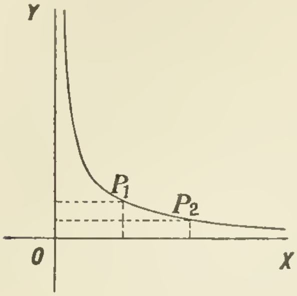
2. If a fugitive, uninvited, applies for protection, it is to be accorded only when his life is in imminent danger from mob violence, and only for so long as such imminent danger continues.

3. A minister is bound to refuse asylum to persons fleeing from the pursuit of the legitimate agents of the Government, and, in case such persons have been admitted, he must either surrender or dismiss them.

4. A minister is obliged strictly to abstain, except under the conditions and limitations prescribed by rule 2, from receiving or retaining persons who are engaged in political agitation, or who, though not formally accused, inspire the Government with distrust.

As ships of war are generally conceded to be exempt from the local jurisdiction of the foreign ports visited by them, it is clearly within the power of commanders of such ships to grant asylum to refugees from that jurisdiction; but it is well settled that 'considerations of propriety and good-faith require' them 'to abstain from abusing the hospitality of the port in which they may be by making their vessels an asylum for offenders against the law' (Moore, *Pol. Sci. Quar.* VII. 408). Neither consuls (q.v.) (who are not diplomatic agents) nor merchant vessels, as a rule, enjoy any exemption from the local jurisdiction, and consequently they can assert no claim to grant asylum. Certain immunities which have been conceded to them from time to time have been exceptional in character, and more in the nature of courtesies extended than of rights admitted. The subject of asylum has been fully and learnedly treated by Prof. John B. Moore in his *Asylum in Legations and Consulates* (New York, 1892); and more briefly in Snow's *International Law*, Sec. 18. See also *Moore on Extradition* (Boston, 1891); Wharton's *International Law Digest* (Washington, 1896); and Woolsey's *International Law* (New York, 1899).

ASYMPTOTE, ăs'ĭm-tōt (Gk. *ἀσύμπτωτος*, *asymptōtos*, not falling together, from *ἀ*, *a* priv. + *σύν*, *syn.* with + *πίπτειν*, *piptein*, to fall). A straight line which a curve approaches nearer and nearer, but does not reach within any finite distance; or, in other words, a tangent to a curve, having the point of tangency at infinity. A clear idea of how a curve may have such a tangent can be procured from one of the well-known laws in physics. According to that law, the greater the pressure exerted upon a gas the smaller the volume it occupies. This law may be presented in geometrical form by drawing two lines, OX and OY (see figure), perpendicular to each other, and then representing pressures by perpendicular distances from the line OX and the corresponding volumes by perpendicular distances from the line OY. By joining the series of points P_1 P_2, etc., thus obtained, the relation existing between the various pressures and volumes may be graphically shown by a curve called an equilateral hyperbola. The greater the pressure the smaller the volume, and hence the smaller the distance between the curve and the line OY. But where will the curve and the line OY be tangent? In other words, where will the distance between them, and hence, the volume of gas, become naught? Evidently, at a point infinitely distant from the line OX—that is to say, at a point representing an infinitely great pressure. For under any finite pressure, no matter how great, a gas still occupies a certain definite volume. The line OY is therefore, according to the definition, an asymptote of our curve, and so is, for analogous reasons, the line OX.



AS YOU LIKE IT. A comedy by Shakespeare, founded entirely on Lodge's romance, *Rosalynde*, save for the introduction of Touchstone, Audrey, and Jaques. It was written in 1599, but did not exist in folio until 1623.

ATA, ä-tä′, **ATAA**, or **ITAA**. A mixed Malay and Negrito people of Misamis Province, Mindanao, with separate speech. It is also the name of a mixed Vicol and Negrito people in Camarines-sur-Province, Luzon. They are not to be confounded with Æta. See PHILIPPINES.

ATACAMA, ä′tä-kä′mä. A northern province of Chile, bounded by the Province of Antofagasta on the north, the Argentine Province of Catamarca on the east, Coquimbo on the south, and the Pacific Ocean on the west. Its area, excluding the desert portion, is 28,380 square miles. The surface is stony, scantily watered, and mostly barren. Its mineral riches, however, lend it considerable importance. Copper and silver are the chief minerals mined on a large scale, but there are also found considerable deposits of gold, nickel, cobalt, and iron. The salt and saltpetre deposits of the province are almost inexhaustible. Owing to its important mineral productions Atacama is well supplied with railway lines, which connect the more important mineral centres. The first railway built in Chile connects the capital with Caldera, the best ocean port of the country. Population in 1895, 59,713. Capital, Copiapó (q.v.). Consult Suess-Margerie, *Face de la terre*, vol. i., p. 692 (Paris, 1897).

ATACAMA. A vast desert region in Chile and partly in Bolivia, extending along the coast of the Pacific, from the River Loa to Copiapó, and embracing the Chilean Province of Antofagasta, and a part of the Province of Atacama (Map: Chile, D 9). It rises abruptly from the coast, attaining an elevation varying between 11,000 to 18,000 feet, and containing a number of volcanoes. In spite of its extreme elevation, the character of the country is but slightly mountainous, and even in the more elevated parts are found large salt lagunes and marshes. The region is very rich in minerals, especially in copper and silver. The scanty rainfall and the scarcity of fresh water make it almost uninhabitable. Prior to 1884 the larger part of the Atacama Desert formed a department of Bolivia, with an area of over 70,000 square miles. At present Bolivia possesses only a small portion of the territory, which is incorporated in the Department of Potosi, while the remainder was ceded to Chile in 1884. Consult: L. Darapsky, "Der Puna de Atacama," vol. xxxiv., *Zeitschrift der Gesellschaft für Erdkunde* (Berlin, 1899); A. Pissis, *El desierto de Atacama, su geologia, sus producciones y minerales*, *Anal. Univ. Chile*, p. 573 (Santiago, 1877).

ATAC′AMITE. A copper hydroxychloride that crystallizes in the orthorhombic system. It is usually found as a bright green sand or incrustation. As sand it was originally discovered in the Atacama Province in northern Chile, whence its name: and it also occurs in Peru, Bolivia, and Australia. It has been found as a crust on the lavas of Vesuvius and Etna in Italy; also in Saxony and in Arizona. The deposits in South America, which contain from 50 to 60 per cent. of copper, are regarded as valuable sources of copper, and have been sent to England to be smelted. Atacamite has been ground up in Chile and sold under the name of *arsenillo* as sand for letters. The greenish incrustation found on antique bronze utensils, weapons, and other articles, and commonly known as *ærugo nobilis*, is composed of this mineral.

ATAHUALPA, ä′tá-wäl′pä (? -1533). Inca of Peru. He was the favorite son of Huayna Capac, who upon his death-bed made Atahualpa King of Quito, while Huascar, his eldest son, received Peru (1525). In the spring of 1530, Atahualpa, incensed at Huascar's demand for homage, declared war against him, and completely defeated Huascar on the plains of Quipaypan, in the neighborhod of Cuzco, the native Peruvian capital, in 1532, a few months before the arrival of the Spaniards. Huascar was taken prisoner and confined in the strong fortress of Xauxa. Then followed, according to Garcilasso de la Vega, a series of atrocious massacres of all the royal family of the Incas. The extent of these massacres was undoubtedly grossly exaggerated by the surviving relatives of the victims, from whom Garcilasso derived his information; but there seems to be no sufficient reason for doubting that Atahualpa killed all whom he had reason to fear as future rivals. In the meantime the Spaniards had disembarked at Tumbez, and after a perilous march through the unknown country, Pizarro, at the head of his 200 cavaliers, approached the victorious camp of Atahualpa, where he found some 50,000 men assembled. By a stratagem Pizarro obtained possession of the person of the king. Atahualpa was treated with a great show of kindness at first, and more especially when he offered, as a ransom, to fill the room in which he stood with gold as high as he could reach. When Atahualpa's brother, Huascar, who was still a prisoner, heard of this he offered still more advantageous terms for himself. To prevent this Atahualpa had him secretly assassinated. The golden treasure which was to constitute the ransom of Atahualpa now began to pour in, and at length Atahualpa demanded his freedom. This Pizzaro refused to grant, and accused Atahualpa of plotting against him. Atahualpa was placed on trial and formally condemned to death upon evidence furnished by an interpreter, who was desirous of possessing one of the wives of the King. He was threatened with burning at the stake as a heretic, but as he submitted to baptism according to the rites of the Church, he was garroted, August 29, 1533. The principal authority is Garcilasso de la Vega's *Royal Commentaries of the Incas*, translated by C. R. Markham for the Hakluyt Society (London, 1869-81). Garcilasso's mother was of the Inca blood, or according to more probable authority one of the royal concubines.

ATAKAPA, ä'tä-kä'pä (Choctaw, man-eater). A cannibal tribe, now extinct, formerly occupying the western Gulf coast of Louisiana. They are believed to have constituted a distinct linguistic stock, although the language shows some slight correspondences with both Carankawa and Tonkawa. The name was sometimes used to include other cannibalistic tribes of the same region.

ATALA, à'tà'là'. A romance of Chateaubriand, published in the Paris newspaper *Le Mercure de France*, in 1801. Atala is the daughter of a North American Indian chief. She falls in love with a prisoner, who is the chief of another tribe, releases him, and flees with him. Having been brought up as a Christian, and sworn by her mother to a single life, she remains faithful to the vow, and finally commits suicide in a fit of religious scrupulosity.

AT'ALAN'TA (Gk. Ἀταλάντη, *Atalantē*). A heroine in Greek mythology. The tradition recognizes two persons of this name, the Bœotian Atalanta and the Arcadian Atalanta, who are often confounded in the ancient accounts, and whom it is not easy to keep apart. (1) The Bœotian Atalanta, daughter of Schœneus, was the most swift-footed of mortals, and, being reluctant to marry any one of her many suitors, she imposed upon all who sought her hand the test of a foot-race with herself. If successful, the suitor was to receive her hand, but, if defeated, he was to be put to death. Hippomenes, son of Megareus, came to the contest with three golden apples, which he had received from Aphrodite. By dropping these successively as he ran along he retarded the course of Atalanta—who stopped to pick them up—and thus won the race and the maiden. On the way home husband and wife profaned the sanctuary of Cybele, and Aphrodite, angered at the ingratitude of Hippomenes, changed them both into lions and yoked them to her chariot. (2) The Arcadian Atalanta, daughter of Jasius and Clymene, was, when an infant, exposed by her father on Mount Parthenius, suckled by a she-wolf, and afterwards rescued and brought up by shepherds. She lived apart from men, the companion of Artemis. Of her, many achievements are related. She slew the centaurs, Rhæcus and Hylæus, wounded the Calydonian boar, took part in the funeral games of Pelias, and sailed with the Argonauts to Colchis. She finally gave her hand to her suitor Meilanion, by whom she had a son, Parthenopæos.

ATALANTA IN CAL'YDON. A play by Swinburne. A quaint dramatic experiment, uniting Greek classic form with modern romantic treatment; a poem, rather than a play. It appeared in 1864. Its choruses are among the author's highest achievements, and it is founded on the famous boar-hunt of Greek legend.

ATALL, ăt'ạl, SIR POSITIVE. A character intended to satirize Sir Robert Howard, in Shadwell's *Sullen Lovers*. He assumes full knowledge on every point, but will admit none on the part of others.

AT'AMAN (Russ. *ataman*, Little Russ. *otaman*, *hetman*, Polish *hetman*, chief of any band or gang. By some explained as an adaptation, *via* Poland, of the AS. *heafodman*, Ger. *Hauptmann*, Eng. *headman*, or *hetman*). The title borne by the chief of the Cossack tribes. Formerly the ataman was elected by the people, the mode being for each man to throw his fur cap at his candidate, the one having the largest heap of caps being elected. After the part played by Mazeppa (q.v.) in the war between Charles XII. and Peter the Great, the office of Ataman of the Cossacks was stripped of much of its importance. Since 1835 the title of chief ataman has been vested in the Russian heir-apparent. The head of each Cossack army is still called ataman, and an ataman presides over the Government of the Territory of the Don Cossacks. Hetman was also the title given by the Poles to the commander-in-chief of their armies, who was absolute in power during time of war.

ATAUL'FUS, AT'AULF, or **ADOLF**, à'dŏlf (? -415). The brother-in -law of Alaric, and his successor as King of the Visigoths (410-15). He assisted Alaric in the sieges of Rome, and after the latter's death went to Gaul, taking as a captive Galla Placidia, sister of the Emperor Honorius, who became his wife in June, 414. He wished to ally himself with Rome, but Honorius was unwilling to form such an alliance. Late in 414 he entered Spain, and in 415 he was assassinated at Barcelona. His last words are said to have been: "If possible live in friendship with Rome, and restore Placidia to the Emperor." Consult: Hodgkin, *Italy and Her Invaders* (Oxford, 1880-85).

AT'AVISM (from Lat. *atavus*, the father of a great-grandfather, an ancestor). A term used in biology to signify the temporary appearance in an individual—plant or animal—of a peculiar character which is not typical of the immediate race or genus, but which is found in allied ancestral races. The term atavism is sometimes incorrectly used as a synonym for reversion. Reversion, as employed by paleontologists and students of evolution, refers to the gradual resumption by a race, during the later stages of its existence, of the general form of its ancestors, generally the form of the earliest ancestral members of the race. Abnormal developments are often examples of atavism, as are occasional modern many-toed horses, which recall the foot structure of the extinct three-toed horses of Tertiary time. Good illustrations of atavism are often also furnished by hybrids. (See EVOLUTION; HEREDITY.)

In sociological literature the term atavism is frequently used, in the sense of reversion to more primitive types, to explain criminal instincts and other social-pathological phenomena. In this sense the term is continually used by Lombroso (q.v.), and by other authors of both the Italian and French schools of criminologists. See CRIMINOLOGY.

ATAX′Y, Locomotor. See Locomotor Ataxia.

ATBARA, ȧt-bä′rȧ, or Bahr-el-Aswad. The most northerly tributary of the Nile, rising at the northern end of Lake Tsana, in Abyssinia (Map: Africa, H 3). It flows northwest through the Nubian Desert, and enters the Nile in latitude 17° N., above Berber. Its most important tributaries are the Setit and Mareb. The Atbara is unavailable for navigation, but it is important on account of the large quantity of water it contributes to the Nile during the rainy season. In the dry season the Atbara is almost waterless, except for a few stagnant pools, unfit for drinking.

ATCHAFALAYA, ăch′*a*-fȧ-lī′yȧ. A river of Louisiana, having its source near the mouth of the Red River in Avoyelles Parish, and serving as an outlet for the Red and the Mississippi rivers during high water (Map: Louisiana, D 3). It flows south, and passing through Grand Lake, empties into Atchafalaya Bay. It is about 225 miles long and navigable for small boats for 218 miles.

ATCHEEN′. See Achin.

ATCHIEVE′MENT. See Hatchment.

ATCHINSK, ȧ-chēnsk′, or **ACHINSK.** The chief town of a district in the Yeniseisk Government, southern Siberia, on the Chulym River. It is on the road to Tomsk and on the Trans-Siberian Railway, 108 miles west of Krasnoyarsk. Population, in 1895, 9767.

ATCH′ISON. A city and county-seat of Atchison County, Kan., 49 miles northwest of Kansas City, Mo.; on the Missouri River, and on the Missouri Pacific, the Chicago, Rock Island and Pacific, the Atchison, Topeka and Santa Fé, the Chicago, Burlington and Quincy, and several other railroads (Map: Kansas, G 2). It is finely situated on the 'Great Bend' of the Missouri; is the seat of a State soldiers' orphans' home, and of Midland College (Lutheran), Saint Benedict's College (Roman Catholic), and Mount Saint Scholastica's Academy (Roman Catholic), and contains a public library, fine county court-house and Government building; Forest, City, and Central parks; and a noteworthy bridge across the river, some 1200 feet long. The Union Depot, erected at a cost of about $140,000, is among the prominent buildings of the city. Its exceptional facilities for transportation by rail and water have made Atchison one of the principal commercial cities of the State; it has an extensive trade in grain, lumber, live-stock, fruit, and general agricultural produce, and large wholesale interests in groceries, drugs, and hardware. Manufactures also are of importance, the industrial establishments including large grain elevators, flouring-mills, railroad shops, foundries, lumber-mills, furniture, broom, and harness factories, carriage-works, and brick-yards. The government, under a charter of 1881, is vested in a mayor, elected every two years; a municipal council; and administrative officials, appointed by the mayor, subject to the confirmation of the city council. The school board is independently chosen by popular vote. Atchison was settled by the pro-slavery party in 1854, during the conflict between that party and the anti-slavery party for the control of Kansas, and was named in honor of Senator D. R. Atchison (q.v.). It was incorporated in 1858. Population, in 1890, 13,963; in 1900, 15,722.

ATCHISON, David Rice (1807-86). An American politician. He was born in Kentucky, removed to Missouri in 1830 and practiced law. In 1834, and again in 1838, he was a member of the State Legislature, and from 1843 to 1855 sat in the United States Senate, being president *pro tempore* in 1846-49, and in 1852-54. A slaveholder himself, he soon became conspicuous as a pro-slavery leader in the debates over the organization of Kansas and Nebraska, and in 1854 fought with Douglas for the passage of the Kansas-Nebraska Act, which involved the repeal of the Missouri Compromise of 1820. Returning to western Missouri in 1855, he there took an active part in the struggle (1856-57) between the pro-slavery and 'free state' parties for the control of Kansas, though for the most part he discountenanced violence and bloodshed.

ATE, ā′tė (Gk. *Ἄτη*, *Atē*, bewilderment, infatuation, from *ἀάειν*, *aaein*, to hurt, damage, infatuate). The blindness which leads men to ruin. Ate is seldom clearly personified. So in the legend of her deception of Zeus and expulsion from heaven, we have scarcely more than allegory, and even in the Greek tragedy Ate is very rarely more than a quality.

ATELIERS NATIONAUX, ȧ′t*e*-lyȧ′ nȧ′syȯ′-nȯ′. See National Workshops.

AT′ELLA′NÆ (Lat. *Fabulæ Atellanæ*, the Atellan fables, farces; also styled *Ludi Osci*, the Oscan plays). A kind of popular drama in Rome, first introduced from Atella, a town in Campania, between Capua and Naples. After the Greek drama had been brought to Rome by Livius Andronicus, the old Fabulæ Atellanæ were still retained as interludes and after-pieces. They are not to be confounded with the Greek satiric drama, although the character of both was to some extent the same. In the latter, satyrs figured, while the former personated real Oscan characters. The Maccus and Bucco of the Fabulæ Atellanæ may be considered the origin of the modern Italian *arlecchino* (harlequin), and other characters of the same stamp. They were the favorite characters, spoke the Oscan dialect, and excited laughter by its quaint, old-fashioned words and phrases. The Atellanæ were neither so dignified as the *comœdia prætextata*, nor so low as the *comœdia tabernaria*, but indulged in a kind of genial and decent drollery. The caricature was at first always pleasant, and, though quizzical, it did not lapse into obscenity, like the *mimi*. Respectable Roman youths, who could not appear as actors in the regular Greek drama without losing caste, were allowed to take part in the Atellanæ. A few fragments in these popular farces have been collected by Ribbeck in his *Comicorum Romanorum Fragmenta* (Leipzig, 1874). Also consult Munk, *De Fabulis Atellanis* (Leipzig, 1840).

A TEMPO, ä tĕm′pō (It., to, or in time). A term used in music to denote that, after some short change in the time, the performer must return to the original tempo.

ATEUCHEUS SACER, ȧ-tū′kŭs sā′sēr. See Scarabæus.

ATH, ät, or **AATH.** A town in the Province of Hainault, Belgium, situated on the navigable Dender, 14 miles northwest of Mons (Map: Belgium, B 4). It has a hospital and college, and important manufactures of linen, calico, lace, gloves, cutlery, large hammers, soap, etc., and carries on a brisk general trade. Population, 1890, 9900; 1900, 11,100.

ATHABASCA, ăth'ȧ-băs'kȧ (N. Amer. Indian, place of hay and reeds). A district in Canada, formed in 1882 out of the Northwest Territories, and enlarged in 1895, so as to contain 251,300 square miles, including 11,800 square miles of water area (Map: Canada, H 5). The district lies between latitude 55° and 60° N. and longitude 100° and 120° W. It is bounded on the north by the district of Mackenzie, on the east by the district of Keewatin, on the south by the districts of Saskatchewan and Alberta, and on the west by the Province of British Columbia. It is a part of the great American Plain, and only in the southwest corner, where it approaches the mountains of British Columbia, does it attain any considerable elevation. Much of its surface, however, is decidedly broken and hilly. The greater portion of the district drains northward into the Mackenzie River system. The western half of the district is crossed by the Athabasca and Peace rivers. There are numerous lakes within the district, of which Reindeer Lake, in the east, and Athabasca, in the north, are very large. An arm of the southern prairie extends from Alberta for a distance up the valley of the Peace River; other portions of the district are wooded. Aspen trees of noble proportions compose the forests of the west, while to the east the trees are more sparse and belong mostly to the three varieties of spruce, banksian pine, and poplar. The climate is subject to great extremes of heat and cold, but is clear and bracing. There is little rain or snow, but the rainfall is greatest when most needed, during the growing summer months. In the west the soil is highly fertile, and wheat, potatoes, and other of the hardier varieties of cereals and vegetables can be successfully raised. In the east the soil is rocky and sandy, and less fertile. Salt and gypsum are found in the Slave River region. The inhabitants are mostly Indians and half-breeds, who live by hunting, the product of the chase constituting almost the only revenue-producing resource of the district. Dunvegan, in the southwest, is the principal settlement. See NORTHWEST TERRITORIES.

ATHABASCA, or ELK, RIVER. A river in the northwest of Canada, included in the great basin of the Mackenzie (Map: Canada, H 5). It rises in Burnt Lake, in the Rocky Mountains, near Mount Brown. Its general course is northeast till, after passing through Athabasca Lake, or rather crossing its west end, it turns toward the northwest, and after a course of 30 or 40 miles, unites with the Peace River, from beyond the Rocky Mountains, to form the Great Slave River, which, again, after passing through Great Slave Lake, takes the name of the Mackenzie (q.v.). Length of Athabasca River to its confluence with the Peace River, 687 miles.

ATHABASCA LAKE. A Canadian lake in the northwest division of the same name (Map: Canada, J 5). It is traversed by the parallel of 59° N. and by the meridian of 110° W.; length, 230 miles; average width, 20 miles. Its principal feeder is the Athabasca River, which enters at the southwestern extremity and forms its only outlet on the northwestern.

ATHABASCA PASS. A defile of the Canadian Rocky Mountains between Mounts Brown and Hooker, which crosses the boundary between Alberta and British Columbia (Map: Northwest Territories, F 4).

ATHAL'ARIC (517-534). King of the Ostrogoths. He was selected by his grandfather, Theodoric the Great, as his successor, and upon the death of Theodoric was recognized as such by the Goths and Romans. In consequence of dissipation, however, he died at the age of 16.

ATH'ALI'AH (Heb., Yahweh is powerful). The daughter of Ahab (II. Kings, viii. 18), King of Israel, and Jezebel, who married Jehoram, King of Judah (ib. viii. 26). After the murder of her son, Ahaziah (II. Kings, ix. 27), who succeeded Jehoram, but reigned for only one year, she paved her own way to the throne by a general slaughter of her grandchildren, Joash alone escaping through the intervention of Jehosheba, the daughter of Jehoram. This occurred c.842 B.C. The young prince thus rescued was privately educated in the temple, and, after Athaliah had reigned six years, the high-priest, Jehoiada, succeeded in the execution of a carefully contrived plan in placing Joash on the throne (c.836 B.C.). Athaliah, hearing the noise attending the coronation, hastened to the temple, where the people were shouting, 'God save the King!' As she looked around in astonishment on the young king, whom she had supposed to be dead, surrounded by priests, Levites, rulers, captains, and a rejoicing multitude, she "rent her clothes, and cried, 'Treason! treason!'" By the command of the high priest, she was led out of the temple and slain in the gateway of the palace. The house of Baal, with its altars and images, was broken down. This narrative (II. Kings, xi.; II. Chron., xxii. and xxiii.) is the subject of Racine's drama *Athalie.*

ATHALIE, ȧ'tȧ'lē' (Fr., Athaliah). The title of a tragedy by Racine, and his last play (1691). Founded upon II. Kings and II. Chronicles, it was written at the suggestion of Madame de Maintenon, who desired for her protégées, the girls of her school at Saint Cyr, a play in which there should be no word of sexual love. The dramatic quality of the play is no less striking than its religious fervor, and the tragedy may well have given a fit opportunity to Rachel's emotional gifts. If not the poet's masterpiece, it is perhaps inferior only to his dramas *Andromaque* and *Phèdre.*

ATH'AMAS. The son of Æolus, and ruler of Orchomenus. At first married to the cloud goddess Nephele, who bore him Phrixos and Helle, he was abandoned by her on account of his love for the mortal Ino, daughter of Cadmus. By Ino, he was the father of Melicertes and Learchus, the latter of whom he slew in a fit of madness. Thereupon Ino cast herself into the sea with Melicertes, and was changed into the sea goddes Leucothea, while Melicertes became Palæmon, a divinity of sailors. Athamas fled to Thessaly, where he married Themisto.

ATHAN'AGILD (?-567). King of the Visigoths of Spain. In 554 he led the uprising against King Agila (549-554), and called the Byzantines of North Africa to his aid. The Emperor Justinian also lent his aid to Athanagild by sending to Spain an army under Patricius Liberius, which conquered the principal seaports on the southeastern coast of the peninsula. Agila was defeated at Seville, and murdered by his followers, and Athanagild succeeded to the throne. He built the churches of Saint Justa and Saint Rufina at Toledo.

ATHAN'ARIC (?-A.D. 381). A king of the Western Goths (Visigoths), whose settlements lay on the north bank of the lower Danube. Having taken advantage of the weakness of the Roman Empire when the imperial armies were engaged in suppressing the rebellion of Procopius, war was declared against him by the Emperor Valens. Athanaric acted strictly on the defensive during two campaigns, in which the Romans gained no advantage over him; but in the third year of the war (A.D. 369), he hazarded a general battle, and was defeated, whereupon he sued for peace, and, with that object, had a conference with Valens in a boat on the Danube. Peace was concluded, and Athanaric had his attention occupied in settling dissensions arising out of the Arian controversy, which then agitated his people, when the first advance of the Huns on Europe alarmed the Gothic nation. Athanaric attempted to secure the eastern borders of his kingdom; but the Huns forced the passages of the Dnieper, defeated the Goths, and advanced in great force into the plains of Dacia. When, in 375, the Western Goths were received by the Romans as allies, and had settlements granted them on the south of the Danube, Athanaric, with a part of his people, refused to accompany them, removing to the west, and fortifying himself against the new enemy. In 380, however, he was obliged to retire, when he accepted the hospitality of the Empire, and removed to Constantinople, where he met with a cordial and honorable reception by the Emperor Theodosius. In 381 died Fritigern, King of the Goths that had settled to the south of the Danube, and Athanaric was thereupon made king of the whole Western Gothic nation. He concluded a treaty of peace with the Empire, and died at Constantinople before the close of the year. Consult: Hodgkin, *Italy and Her Invaders*, Vol. I. (Oxford, 1880).

ATHANASIA, ăth'ȧ-nā'zhĭ-ȧ, SAINT (c.810). She was born on the island of Ægina. After her second husband had taken monastic orders, she converted her house into a monastery, over which she presided as abbess. She is usually represented with a star upon her breast and a spinning-wheel. August 14th is dedicated to her by the Church.

ATHANASIAN (ăth'ȧ-nā'zh*a*n) **CREED**, THE. Often called the Quicunque, from its first Latin word. The longest of the three so-called ecumenical creeds, and the latest in time of composition. (See CREEDS AND CONFESSIONS and NICENE CREED.) It was long supposed that the Athanasian Creed was the work of the saint whose name it bears. Mediæval legend said that Athanasius wrote it while in exile in Rome, during the episcopate of Julius I. (337-352), but since the Seventeenth Century this theory has been shown to be untenable. Among the arguments against it are these: The creed was written in Latin, whereas Athanasius spoke and wrote Greek; it is nowhere mentioned by Athanasius, or by any of the other Greek fathers of the century after his death; it omits certain forms of statement which Athanasius was specially interested in maintaining, and includes others which were not formulated until a later time; and it appears first in the West, and never received the sanction of the Eastern Church at all. On the other hand, a study of the contents of this so-called creed, and a careful comparison of other documents, make it appear probable that what we have is in fact not a creed at all, but rather an explication, or setting forth, first, of the Catholic doctrine of the Trinity, and, secondly, of the person and work of Christ. The creed thus falls into two main divisions, the former clearly depending upon the teaching of Saint Augustine, the latter upon the Christology of Chalcedon (q.v.). It may have been, wholly or in part, a sermon on the creed, such discourses being very common at that age of the Church. And indeed Hincmar of Rheims (Ninth Century), expressly calls this creed *sermonem Athanasii de fide*. Or it may have been regarded as a sort of hymn or chant, to be used in public worship, like that other great Christian piece, the Te Deum. We know that in the Middle Ages the Quicunque was actually recited at Prime by the monks in the monasteries of Southern Gaul. This liturgical use of our symbol can be traced as far back as the Carolingian period, and the formula itself is doubtless still older. It is apparently referred to in the acts of the Synod of Autun (c.670 A.D.), and most modern scholars are inclined to place its composition, or compilation, in the Sixth Century.

Striking parallels, amounting sometimes to verbal identity, are found to the Athanasian Creed in a sermon falsely attributed to Augustine, but really perhaps by Cæsarius of Arles (ps. Augustine. *Sermo* 244), in the *Commonitory* of Vincent, of Lerins (A.D. 434), and in Augustine's treatises on *The Trinity* and *Christian Doctrine*, which are still older. At least one of the characteristic phrases of this creed was current in the West early in the Third Century (Tertullian: *adv. Prax.* 13, "The Father is God, and the Son is God, and the Holy Ghost is God, and each is God"). It would appear, therefore, that we have to do, not with the work of any single writer, but with a document which was produced gradually, perhaps put together from various sources, but worked into a unity under Augustinian influence, and reaching its present form by the Sixth Century, probably in Southern Gaul.

At the beginning of the Athanasian Creed, and also at the end of each of its two divisions, occur damnatory clauses, pronouncing eternal doom upon all who do not accept the Catholic faith as here set forth. So far as doctrine is concerned, the creed agrees with the theology of Western Christendom, including Protestantism. But objection has often been made, by some critics, to the way in which the faith is here expressed, especially to its rigid form, its highly artificial refinements, its mathematical precision, the minute detail arising from its great length, and the damnatory clauses. Most Protestant churches do not make use of this creed, although it is retained in the English Book of Common Prayer, and is appointed to be read in that Church on thirteen special days of the year. The American Episcopal Church has dropped it entirely.

For the text of the Athanasian Creed, consult the English Prayer Book, and Philip Schaff, *Creeds of Christendom*, Vols. I. and II. (New

York, 1884). Consult also: A. E. Burn, *The Athanasian Creed and Its Early Commentators* (Cambridge, 1896); G. D. W. Ommanney, *Critical Dissertation on the Athanasian Creed* (Oxford, 1897).

ATHANASIUS, ăth'ȧ-nā'zhĭ-ŭs, Saint (Gk. 'Αϑανάσιος, *Athanasios*) (c.293-373). The father of Greek orthodoxy, Bishop of Alexandria, and the most eminent theologian of the Fourth Century. He was born probably in A.D. 293, in Alexandria, where he died in 373. His parents are said to have been Christians. We know little about his youth, except that he was well educated and brought up for the service of the Church. Rufinus tells us that in early boyhood Athanasius played at being bishop and baptized some of his mates according to the rules of the Church, and that the bishop afterwards recognized their baptism as valid; but this story rests upon no sufficient evidence. Athanasius began to serve the Church as reader, and was advanced to the office of deacon before the beginning of the great theological struggle which led up to the Council of Nicæa (A.D. 325), where he appears as an opponent of the presbyter Arius, who also lived in Alexandria. His life is intimately connected with the progress of the Arian controversy, and he was by far the most formidable antagonist whom that heresy encountered. For many years it was 'Athanasius contra mundum'; but his great ability and perseverance gained the victory in the end. (For particulars respecting this struggle, see Nicæa, Council of; and Arius.) Athanasius advocated the famous *homoousion* doctrine, which was that the Son of God is of the same essence or substance with the Father, whereas Arius maintained that the Son was a creature, something less than God, though more than man. All the Trinitarian and Christological speculations of the Fourth and Fifth centuries have their roots in this controversy.

Athanasius became Bishop of Alexandria, probably in A.D. 326, and his episcopate lasted until his death, forty-seven years afterwards. At this time Alexandria was not only one of the leading cities of the Empire, but also one of the most important in the Church. For more than a century the greatest theologians had worked and taught here, and here, too, divergencies from Catholic orthodoxy were by no means rare. During the progress of the Arian controversy politics mingled with theology, and each side labored to win Imperial favor. The Arian party was influential at court and very active. Five times Athanasius was sent into exile, and more than one-third of his long episcopate was spent away from his see. Almost from the first, charges of immorality, sacrilege, sorcery, treason, and even murder were brought against him by his enemies; but in every case the verdict of history has pronounced him innocent. A grossly partisan synod at Tyre (335) condemned him, and the outcome was his first banishment, lasting two years, which he spent at Treves. He was pardoned after the death of Arius, and returned to Alexandria amid the acclamations of the people (337). The Emperor Constantius banished him again in 339, and this second exile extended over seven years. Athanasius sought refuge with Julius, Bishop of Rome, where he was well received, and where, according to an unreliable tradition, he is said to have written the Athanasian creed (q.v.). Leaving Rome, he visited Gaul, Dacia, Aquileia, and Antioch. In 346 he was permitted to return to his see, and the joyful people streamed forth to meet him 'like another Nile.' By favor of the Emperor Constans Athanasius now enjoyed ten years of comparative quiet; but in 356, owing to the renewed ascendency of the Arian party, who had gained control of all the churches in Alexandria, he was once more compelled to seek safety in flight. For six years he dwelt among the Egyptian hermits, or concealed himself in the neighborhood of the capital, where he could secretly watch the fortunes of his church. These years were fruitful in literary labor, and at the same time they gave him a more intimate knowledge of the monastic life. Athanasius was the first episcopal patron of the monks, and it is largely through him that the Western Church came to know of the Egyptian hermits. After Julian's accession, a policy of religious toleration was inaugurated, and Athanasius was recalled. But the Emperor had a personal falling out with the Bishop the same year (362), and issued a special edict against him, so that he fled to Thebaïs, where he remained about eighteen months. His fifth and last exile lasted only four months, and brings us down to the year A.D. 366. Seven years of life remained to the aged Bishop, and these were spent in quiet labor at his post, enjoying the honors which his fidelity had earned. The theological battle was practically over, and the victory rested with the cause of Nicene orthodoxy. Athanasius's disciples, especially Basil the Great and the two Gregories, were instrumental in securing the final verdict in its favor at the second Ecumenical Council at Constantinople (381).

Athanasius was a voluminous writer. His works are chiefly controversial and dogmatic, though some are exegetical and pastoral. Highly valuable to the historian are such works as the *Discourses Against the Arians*, the *History of the Arians*, the *Apology Against the Arians*, and *On the Decrees of the Nicene Synod*. The *Life of Saint Anthony* purports to describe that famous hermit, but it is full of legendary material. A series of *Festal Epistles*, relating to the celebration of Easter, contains much valuable material of various kinds, e.g. the Thirty-ninth Epistle, for the year 367, gives a very important list of the canonical books of the Bible.

The Benedictine edition of Athanasius's works appeared in Paris (3 vols., 1698). Migne's *Patrologia Græca* (Vols. XXV.-XXVIII., Paris, 1857) is more nearly complete, but has the usual faults of that collection. The *Festal Epistles* were edited by Cureton (London, 1848). An English translation of the *Historical Tracts* and *Treatises in Controversy with the Arians* may be found in *The Library of the Fathers* (Oxford, 1843). Selections from his writings, including all the most important, and also his letters, are translated by Archibald Robertson, who furnishes elaborate prolegomena discussing "The Life and Theology of Athanasius," in the *Nicene and Post-Nicene Fathers* (second series, Vol. IV., New York, 1892, edited by Schaff and Wace). Bibliography: William Bright, *Lessons from the Lives of Three Great Fathers* (London, 1890); F. W. Farrar, *Lives of the Fathers* (Vol. I., New York, 1889); W. Cave, *Lives of the Fathers* (Vol. II., edited by Cary, Oxford, 1840);

and the article on Athanasius in Smith and Wace's *Dictionary of Christian Biography*. For the teaching of Athanasius, consult: Harnack, *History of Dogma*, Vol. IV. (London, 1898); and Fisher, *History of Christian Doctrine* (New York, 1896).

ATH′APAS′CAN STOCK. One of the most important and most widely extended linguistic stocks of North America, having its territorial and tribal nucleus along the Yukon and Mackenzie rivers of Alaska and British America, but extending in detached tribes on both sides of the great divide southward almost to Central Mexico. The line of migration has evidently been by successive conquests from north to south, the original tribes everywhere giving way before the more warlike Athapascans. Tribal characteristics and habits are as various as might be expected in a race scattered from the Arctic zone to the tropics. Among the more important tribes may be named the Chippewayan, Kutchin, Taculli, Sarsee, Hupa, Wailaki, Navajo, Apache, Jicarilla, Mescalero, and Lipan. See Plate American Indians, accompanying Indians.

ATHARVA, ȧ-t′här′vȧ, or **ATHARVAN**, ȧ-t′här′v*a*n, or **ATHARVAVEDA**, ȧ-t′här′vȧ-vā′dȧ. The name of the fourth Veda (q.v.).

A′THEISM (Gk. *ἀ*, *a* priv. + *θεός*, *theos*, god). The doctrine that there is no God. It is to be clearly distinguished from agnosticism (q.v.), which is a profession of ignorance about God, not a denial. It has sometimes been doubted whether there ever were atheists; but while many have been charged with it when they merely denied some form of current theism, or some of its supposed consequences, there seems no reason to say that there have not been real atheists. No clearer affirmations of atheism than those of Feuerbach and Flourens could be made. One cannot say that atheism is so unthinkable that it can never have existed. However contrary to right reason, it is not inconceivable. The doctrine of God must receive some formulation; and it is always possible to deny any formulation which may be made. Neither is it more necessary to possess omniscience to deny the existence of God than to make any affirmation dependent upon mere induction. Yet the instincts of men are against atheism. Even when men have not been convinced by the theistic arguments (see Apology; Religion, Comparative; Theism), they have not generally proclaimed atheism. Its vast unpopularity, increased by the suspicion of lack of patriotism in nations where there has been a State religion, has assisted in preventing its spread.

ATHEIST, The. Otway's last play, being a continuation of *The Soldier's Fortune*, produced at Dorset Gardens, in 1684, with Betterton as Beaugard and Mrs. Barry as Porcia. Its plot, which is extremely involved, is drawn from a French novel, *The Invisible Mistress*, by Scarron. It was dedicated to Lord Elande, son of the Marquis of Halifax.

ATHEIST'S TRAG′EDY, The. One of Cyril Tourneur's best-known plays. It bears the sub-title of *The Honest Man's Revenge*, and, when published in 1611, also bore the note, "As in divers places it hath often beene acted." It was probably written in 1600. The plot, grotesque and crude, is drawn from the *Decameron*. As poetry, it contains several passages of no little imaginative power.

ATH′ELARD. See Adelard.

ATH′ELING (AS. *Ætheling*; Ger. *Adel*, nobility). Among the Anglo-Saxons a general designation for a noble. In the Ninth and Tenth centuries it was often restricted to members of the royal family, and sometimes to the heir to the throne.

ATH′ELM (? -923). An archbishop of Canterbury. He became Bishop of Wells in 909, and Archbishop of Canterbury in 914, and obtained the pall from Pope John X. Athelm was the brother of Heorstan, the father of Saint Dunstan. The statement of Florence of Worcester that Athelm crowned Athelstan is an error, as the Archbishop died January 8, 923, and was succeeded by Wulfhelm, who probably officiated at the coronation.

ATHELNEY, āth′el-nĭ, Isle of (AS. *Æthelinga*, princes' + *ig*, island). An island in the midst of a marsh, at the junction of the rivers Tone and Parret, in the middle of Somersetshire, England. Here Alfred established his camp as a rallying-point against the Danes, and later (in 888) founded a Benedictine abbey, now entirely gone. Athelney is the scene of Alfred's reputed adventure with the cakes.

ATH′ELSTAN (AS. *Æthele*, noble + *stān*, stone), or **ÆTHELSTAN** (895-940). The grandson of Alfred the Great, and the first monarch who took the title of King of England. He was crowned at Kingston, in Surrey, in 925, and seems to have possessed both great ambition and high talent. It is supposed that his design was to unite in subjection to his single sway the entire island of Britain. On the death of Sihtric, King of Northumbria, who had married one of his sisters, Athelstan took possession of his dominions. This excited the alarm and animosity of the neighboring States, and a league, composed of Welsh, Scotch, and English, was formed against him. Athelstan crushed this coalition; but later another more formidable revolt occurred. A fierce and decisive battle was fought at Brunanburh, in 937, in which the allies were utterly defeated, and which became famous in Saxon song. After this, the reputation of Athelstan spread to the Continent. Four of his sisters married prominent rulers—viz., Otho the Great, Charles the Simple, Hugh the Great, and Louis, King of Arles. At home he exhibited a deep interest in the welfare of his people, improved the laws, built monasteries, and encouraged the translation of the Bible into the vernacular. He died at Gloucester, October 27, 940. Consult Freeman, *Old English History* (London, 1869) and *The Norman Conquest* (London, 1885).

ATH′ELSTANE. A character in Scott's *Ivanhoe*. Although of gigantic strength, he is nicknamed 'The Unready,' because of his phlegmatic temperament. He is a suitor for the hand of Rowena, but in the end renounces his pretensions in favor of Ivanhoe. His title is 'Thane of Coningsburgh.'

ATHE′NA. See Minerva.

ATH′ENÆ′UM (Lat. *Athenæum*, from Gk. *Ἀθήναιον*, *Athēnaion*, Temple of Athene). The name applied in general to temples dedicated to the tutelary goddess of Athens, though more particularly used to designate one of these temples in Athens where poets and men of letters were accustomed to meet and read their productions. At Rome, the Athenæum was a celebrated institution of learning, founded by Hadrian about A.D. 135. The building was in the form of a theatre, in which poets and rhetoricians read their productions, delivered lectures, and held recitations. Salaried professorial chairs were attached to the Athenæum, which thus became a species of university. In this form it survived until the Fifth Century. Similar institutions, bearing the same name, were established in Lyons, Marseilles, and other provincial centres. In modern times, the term has become a very general designation for literary or scientific clubs and societies, or for the building in which they meet, and has been the title of a number of important literary journals, notably of one in Paris and of one in London. The term is also applied in Belgium and Holland to schools of a grade below the universities. The best-known club is that founded in London in 1824. Its members are exclusively artists, their patrons, and men of title. They occupy rooms at 107 Pall Mall.

ATH'ENÆ'US (Gk. 'Αθήναιος, *Athēnaios*). A Greek writer who flourished in the latter half of the Second and the early Third Century A.D., born at Naucratis, in Egypt. He lived first at Alexandria and afterwards in Rome; but we possess no further details of his life. His great work was the *Deipnosophistæ* (*The Dinner of the Learned*), in fifteen books, of which the first two and parts of the third, eleventh, and fifteenth, have come down to us only in abridged form. After the model of Plato's Symposium, Athenæus relates to his friend Timocrates the table talk at a dinner given by one Larensius, to which twenty-nine guests were invited. Among them were jurists, poets, grammarians, philosophers, orators, physicians, and musicians. The work, as a matter of fact, consisted of extracts from an enormous number of books which are introduced into the imaginary conversation. Almost every possible subject is discussed, but the author is especially fond of scandal and of cookery. The work has not a single gleam of genius, the dialogue is prolix and lumbering; but as a storehouse of miscellaneous information the book is invaluable. The date of composition is after A.D. 192, for the Emperor Commodus, who was murdered in that year, is ridiculed in it; according to Kaibel, after 228. The best edition is by Kaibel (1887-90); also edited by Schweighäuser (1801-07); Dindorf (1827); Meineke (1858-67); translated in Bohn's Classical Library (1854).

ATH'ENAG'ORAS (Gk. 'Αθηναγόρας). An early Christian philosopher, who taught first at Athens and afterwards at Alexandria. He is one of the oldest of the apologetical writers, and is favorably known by his *Legatio pro Christianis*, which he addressed to the Emperor Marcus Aurelius, in the year A.D. 177. He therein defended the Christians against the monstrous accusations of the heathens—viz., that they were guilty of atheism, incest, and cannibalism. His work is written in a philosophical spirit, and is marked by great clearness and cogency of style. We likewise possess a valuable treatise of his on the resurrection of the dead. See the English translation in *Ante-Nicene Christian Library*, II., 129-162 (New York, 1867).

ATH'ENA'IS. See EUDOCIA.

ATHENE, à-thē'nē. See MINERVA.

ATHENE, TEMPLE OF. (1) A famous Doric temple at Ægina, of which 22 columns remain. The sculptures of the pediment, representing a contest of Trojans and Greeks, are among the Æginetan Marbles at Munich. (2) An old temple at Athens, situated between the Parthenon and the Erechtheum, the foundations of which were identified in 1885 by Dörpfeld, who has based on them a reconstruction of the temple. (3) An archaic Doric temple dating from the Sixth Century B.C., at Syracuse, now a cathedral. (4) See PARTHENON.

ATHENE NI'KE, TEMPLE OF. See NIKE APTEROS.

ATHENE PAR'THENOS (Gk. 'Αθήνη παρθένος, Athene, the Virgin). A small, inferior copy of the great chryselephantine statue of Athene. It is in the possession of the National Museum at Athens. The original was the work of Phidias for the Parthenon.

ATHEN'ODO'RUS (Gk. 'Αθηνόδωρος, *Athēnodōros*). (1) A Rhodian sculptor of the First Century B.C., who, with two others, produced the famous "Laocoön." (See LAOCOÖN; GREEK ART.) (2) Surnamed *Cananites*, from *Cana*, in Cilicia. A Stoic philosopher, the instructor of Augustus when a boy at Apollonia; he came afterwards to Rome, where the Emperor favored him highly, and made him tutor of the young Tiberius. His influence was great at court, and he was very free-spoken. He is said to have advised Augustus to repeat the alphabet whenever he felt himself giving way to anger. In his old age Athenodorus returned to his native town, Tarsus, where he died.

ATH'ENS (Gk. 'Αθῆναι, *Athēnai*, usually derived from the name of the goddess Athene). The capital of the kingdom of Greece and of the nome of Attica; situated in latitude 37° 59′ N., and longitude 23° 41′ E., on the southwest coast of Attica, less than 3 miles from the Saronic Gulf at the nearest point, and about 4½ miles from the harbor of Piræus, in the plain bounded on the northwest and north by Mount Parnes, on the northwest by Mount Pentelicon, on the east by Mount Hymettus, on the south by the sea, and on the west by Mount Ægaleos (Map: Greece, E 4). It is 350 feet above sea-level and has a moderate climate, the mean temperature ranging from 46° F. in January to 81° in July. The cluster of houses at the foot of the Acropolis on the site of ancient Athens forms the inner city, with narrow, crooked streets; and outside of this the Neapolis, or new city, extends in a semicircular arc, which is regularly laid out and divided into six districts. It is connected with the older portion by Hermes and Æolus streets, the main business thoroughfares, which intersect at Constitution Square, the site of the royal palace and gardens. In the modern section the Square of Harmony (Place de la Concorde) forms a centre from which wide boulevards radiate in various directions, the most important of which are Piræus Street, Athens Street, Stadion Street, and University Street, the last two ending in Constitution Square. On the two avenues last mentioned stand the Government offices and the buildings of the archæological colleges, of the

Academy of Sciences, of the National Library, and of the National University. Other important modern structures are the Royal Palace, erected from 1834 to 1838, situated amid magnificent gardens; the House of Parliament, Palace of Justice, the Polytechnic Institute, National Archæological Museum with its priceless collections, the Metropolitan, Roman, and Anglican churches, and extensive cavalry barracks. For illustrations of the architectural features of Athens, see article ARCHITECTURE.

The government of the city is administered by a mayor, or *demarchos*, chosen by popular vote every four years, together with a council of eighteen members, which has jurisdiction over the suburbs of the parish. There is a municipal fire department, but the police is under the control of the central Government. The city owns its gas and electric plants as well as the waterworks, which include the ancient aqueduct of Hadrian, but the water supply is so scanty that the inhabitants are obliged to supplement it by purchase from water-carriers. Street cars traverse the city in every direction, and railroads from all parts of Greece converge here. A suburban line runs to the bathing resort of Phaleron, close to the port of Piræus. Athens is the seat of several foreign consulates, including one of the United States. It is the financial centre of Greece, although it does little manufacturing, and trades only in imports for its own consumption. It is the seat of a Greek Metropolitan. The population has been steadily increasing in the last quarter of a century. It numbered 66,834 in 1879, 107,251 in 1889, and 111,486 in 1896, exclusive of the suburbs.

EDUCATION. There are in the city primary, secondary, normal, technical, and industrial schools, and the National University, founded in 1837, which was named Otho University, in honor of King Otho, and after his abdication received its present title. The income of the University is over $60,000; the number of students about 3000. The faculties comprise theology, law, medicine, and arts. The university has a number of museums, laboratories, and a library of more than 200,000 volumes and 2000 MSS. Besides this there are the rich library of Parliament, with 160,000 volumes, the National Museum, and that of the Acropolis.

But to foreigners the chief educational importance of Athens centres not in the university, but in the various schools established there by other nations, for study of Greek archæology. Of these the American School of Classical Studies is of especial importance. It was founded by the Archæological Institute of America and opened in 1882. It is supported by regular contributions from American universities and colleges and by gifts, and has a permanent director and secretary and a professor of Greek language and literature chosen annually from among the institutions which support it. It has three scholarships, two for men and one for women. Its students are in the main drawn from American colleges and universities. Besides instruction it devotes much time to investigation. Its organ is the *American Journal of Archæology.* Like this in many respects is the French School at Athens, founded in 1846, which is supported by the State and controlled by it, with the assistance of the Academy of Inscriptions and Belles-Lettres. It is managed by a director and associates. The British School at Athens was founded in 1886, is supported partly by the Government and partly by contributions from the Universities of Oxford and Cambridge, the Society for the Promotion of Hellenic Studies, and private subscription. It is under the control of a managing committee in London and a director, assistant-director, and secretary in Athens. Like the American School, it devotes itself to both teaching and excavation. Of equal importance is the Royal German Archæological Institute, founded in 1874, supported by the Government and under the control of a directorate in Berlin, represented by secretaries both in Athens and in Rome. The work of this institute has been of an unusually high character. All these organizations issue monographs and proceedings.

HISTORY. The early history of Athens is involved in obscurity. The Athenians themselves claimed to be *autochthones*, and there can be no doubt that Attica was outside of the great waves of migration that swept over northern Greece and the Peloponnesus. It cannot, however, have been entirely unaffected by these movements, and it is probable that the Athenians, the most brilliant of the Greeks, were a mixed race, and by no means of the pure Ionian stock. In the earliest times Athens, or Cecropia, was only one of a number of petty States, but tradition said that it became the capital under Theseus, who united the whole of Attica under his rule. Theseus (q.v.) may be mythical, but it is certain that Athens early became so thoroughly the capital of the country that only Eleusis preserved the memory of independence. Like all the early States, Athens is said to have been ruled by kings, of whom the last was Codrus (q.v.). The rule of archons, chosen for life, seems to represent the limitation of the royal power by the nobles, Eupatridæ; and when, in B.C. 753 (according to tradition), the term of office was made ten years, and in B.C. 683 reduced to one, it is clear that the Government had become an aristocracy. The name of King was indeed always retained as a title for that one of the archons (q.v.), to whom were intrusted the old priestly functions of royalty. Another archon was called Polemarchus, as the commander in war; while the first, who seems to have been charged with the civil government was called simply 'the archon,' and gave his name to the year. (See ARCHON.)

During this early time the citizens were divided into four tribes, and each tribe into three brotherhoods, though these associations seem to have been older than the tribes. At first only the members of the noble clans belonged to the brotherhoods; but some time in the Seventh Century B.C. the peasants and craftsmen, who were organized like the nobles, seem to have been admitted, and later enrollment in a brotherhood was required of all legitimate children. The aristocratic government of the three archons and the Council of Elders was forced by the changes common to the Greek world after B.C. 700, to give increasing recognition to wealth apart from birth. The exact course of this revolution cannot be traced, but one step was the institution of the six Thesmothetæ, or junior archons, who took charge of the judicial system. The commercial development of Athens was rapid during this period, and led early to the creation of a fleet, though of the details of its organization we are not informed. This prosperity and the introduction of a metallic currency do not seem to have helped the small landowners or the peasants, and though they loyally supported the Government against the conspiracy of Cylon (about 630 B.C.), their condition seems to have grown worse rapidly, perhaps in consequence of a war with Megara. To help them against the oppression under which they suffered, it was decided to form a written code of laws, and about B.C. 621 this work was intrusted to Draco (q.v.). His labors did not give sufficient relief. The small farmers were driven to borrow money, mortgaging their land, and thus rapidly falling into the power of the rich, while the tenants, who rented land, were often reduced to slavery and even sold out of the country, from inability to pay their debts. A revolution seemed imminent, but was averted by the wise legislation of Solon (q.v.) in B.C. 594-93 or 592-91. By cancellation of all debts involving the freedom of the debtor, and by freeing all in slavery for debt, he relieved the freeman, while, by the substitution of the Eubœic for the Æginetan standard in coinage, he brought Athens in alliance with Chalcis and opened the way to the development of the western trade. His great service was the reform of the constitution on a really democratic basis, though outwardly it was still a timocracy. Four classes were now recognized, according to the wealth of the individual citizens, and though the archonship was open only to the first class, and no offices were granted to those in the fourth, yet as all citizens could vote in the Ecclesia (q.v.), and sit in the courts, now established, the election and judgment of the magistrates was in the hands of all and not a privileged few.

The old Council of the Areopagus, composed henceforth of ex-archons, was made the supreme guardian of the laws, and a new senate of 400, chosen equally from the four tribes, was instituted to prepare the business for the Ecclesia. Though the situation was much alleviated by the reforms of Solon, the political parties still continued their struggles. The party of the nobles, living chiefly in the city and the Attic plain, was known as that of the Plain; the moderate party, which was satisfied with the new order, was largely composed of the middle class, and, from the residence of many of them, was called that of the Coast; a third party of a more radical type was that of the Hills, for most of its members seem to have come from the mountain regions. Aided by these Pisistratus (q.v.) made himself tyrant (B.C. 561), and, though twice driven out, finally handed down his power to his sons, who ruled till the murder of Hipparchus (B.C. 514) and expulsion of Hippias (B.C. 510). During this time the forms of the constitution had been observed, though all offices had been filled by the friends of the tyrants. The period was one of growth in foreign influence, and internal prosperity. The tyrants beautified the city with new temples, introduced a better supply of water, and inaugurated more splendid festivals, thus producing greater contentment with their rule.

After the overthrow of this tyranny by Clisthenes, party strife broke out afresh; but Clisthenes finally succeeded in securing a revision of the constitution which removed entirely the danger of local parties. As a basis for his division of the people, he took the villages or small districts scattered through Attica. These were divided into 30 groups, so arranged that 10 groups were along the coast, 10 in the inland, and 10 about the city. By combining one group from each of these three regions, he formed 10 tribes, which he named after ancient Attic heroes (Erechtheïs, Aigeïs, Pandionis, Leontis, Acamantis, Oineïs, Cecropis, Hippothontis, Aiantis, Antiochis). These tribes were the chief divisions of the people, and from this time the number ten regularly recurs among the various governing boards of Athens. The old Senate of 400 was replaced by a new one of 500, which became the executive organ of the Government, supervising all officials, and the finances, and even the military management. For convenience in the transaction of routine business the year was divided into 10 periods, and during each period the 50 senators of a tribe, the so-called Prytanes, acted as a standing committee, though the whole body met daily. Along with the new constitution an increase in the citizenship took place, and, though the old property classes and their privileges were undisturbed, the increase of wealth had largely increased the number who could hold office. With Clisthenes the Athenian democracy was fairly established, though other changes in the direction of equalization of privileges, such as the election of archons by lot, the establishment of pay for service in the courts and at the assembly, and a reduction of the power and influence of the Areopagus, were carried out in the course of the Fifth and Fourth centuries, not always to the advantage of the State. The new Government at once proved its value by the rapid advance of Athenian power, which was raised to an undreamed-of height by the repulse of the Persians, and the establishment of the Delian League, which made Athens mistress of the Ægean and its islands. This period (B.C. 480-430), which culminated in the age of Pericles, is the Golden Age of Athenian greatness, and to it belong the greatest triumphs of Athenian genius, the poetry of Æschylus and Sophocles, and the sculpture of Phidias. From this time the history of Athens is merged in the general history of Greece (q.v.). Though the Peloponnesian War deprived Athens of much of her power, her place as the centre of Hellenic culture remained unshaken, and even when the battle of Chæronea (B.C. 338) deprived her of political position, the philosophic schools and the traditions of the past continued to attract foreigners. The democratic constitution was overthrown by Antipater (B.C. 322), but its forms were afterwards restored, and many of the official titles continued to exist long after the incorporation of the city in the Roman Empire.

Under Roman rule Athens prospered, and became the great centre of education for the youth of aristocratic Rome. (See Capes, *University Life in Ancient Athens*, London, 1877.) The Emperor Hadrian, in particular, enlarged the city to the northeast, where a new quarter was named Hadrianapolis in his honor, and built a gymnasium and library. It was about this time that Herodes Atticus erected his Odeum as a memorial of his wife Regilla, and repaired the Stadium. The fame of the philosophic schools continued to attract students, though with the spread of Christianity they lost influence and were finally closed by Justinian in A.D. 529. During the following centuries many of the temples were converted into churches; but from the Sixth to the Eleventh Century Athens almost disappears from history. Basil II. visited it in 1018 to celebrate a victory over the Bulgarians, and in 1175 Michael Acominatos became Metropolitan of Athens. His letters and orations give a valuable picture of the wretchedness and desolation into which the city had fallen. In 1204 the capture of Constantinople by the Crusaders enabled Boniface of Montferrat to establish himself as king at Thessalonica, while Athens and Thebes fell to his feudal vassal, Otho de la Roche, and in 1260 the Frankish rulers assumed the title of Dukes of Athens, their dominion also including Thebes, Megara, and Argos. A succession of Frankish dukes ruled until the disastrous battle of Lake Copaïs threw the real power into the hands of the great Catalan company of mercenaries, and they seem to have held the real control, though recognizing the suzerainty of non-resident dukes, until 1387, when Nerio Acciajuoli, a Florentine who at the time ruled Corinth, made himself master of the city, and he and his successors maintained control over it until 1458, though after 1392 they were tributary to the Sultan, who was the real ruler of Athens.

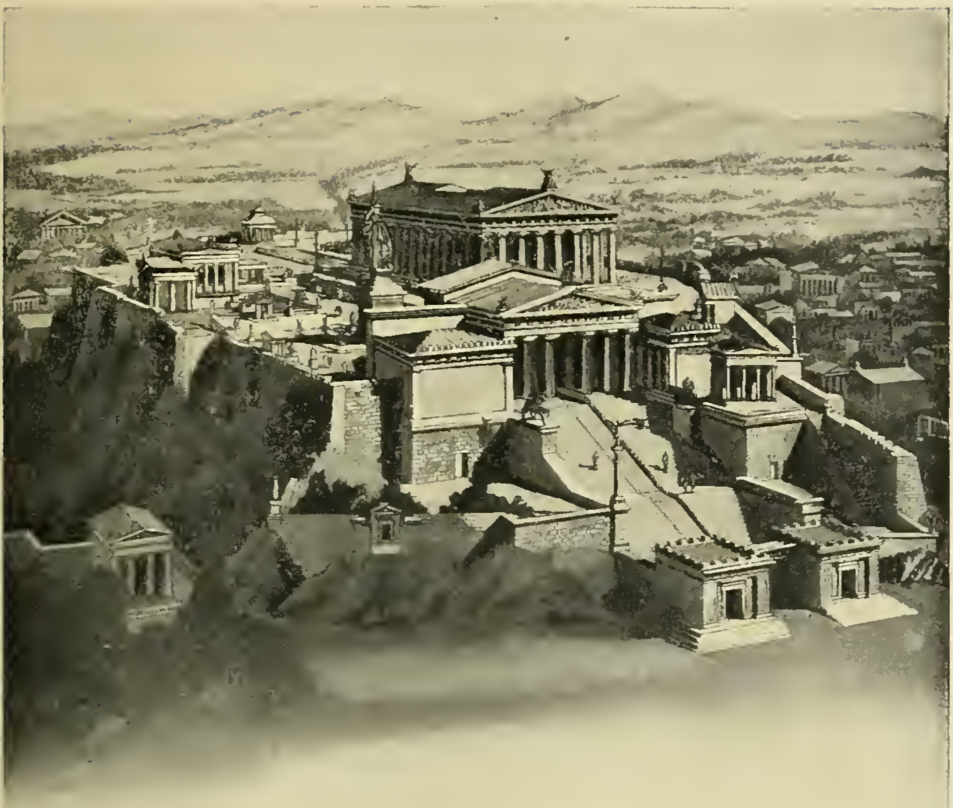
For a long while after its capture by the Turks, Athens almost disappeared from the view of the Western world, but a letter written in 1578 gives the population at the time as 12,000. The Venetians captured the city in 1687, and during the siege a bomb partially destroyed the Parthenon, which had been used as a powder magazine by the Turks. In 1690 the Turkish rule was reëstablished, and continued until the achievement of Greek independence, though it was not till 1833 that the Turkish garrison was withdrawn. In 1835 the capital of the new kingdom was established at Athens, and with this period begins the history of the modern city.

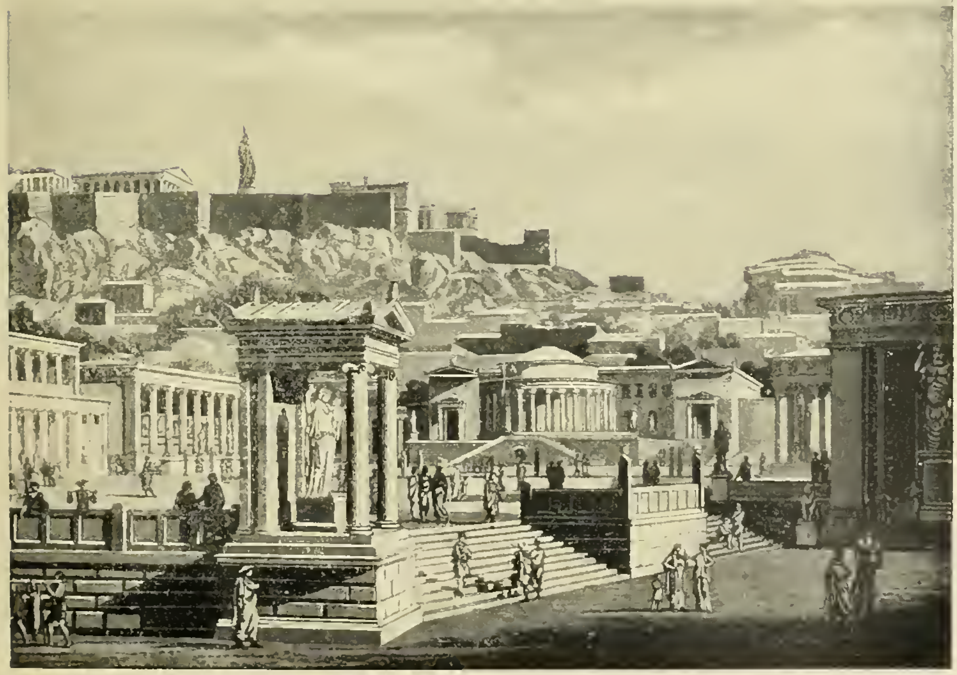
ARCHÆOLOGY. The central point of the ancient city was the Acropolis (q.v.), but the modern city lies almost entirely to the north and east between the Acropolis and Mount Lycabettus, and along the west slope of the latter, though a modern quarter is growing up on the banks of the Ilissus. On the east and south of the city flows the Ilissus, and on the west the Cephissus, whose scanty supply of water is now largely diverted for the irrigation of the extensive olive groves in that quarter. Though the city itself is some distance from the sea, it is well supplied with harbors. The first harbor was the open bay of Phalerum, with its sloping sandy beach, well suited for the light boats of the early time, but not easy of defense. Somewhat farther from the city is the rocky peninsula of the Piræus, with two small harbors, Munichia and Zea, on the east; and on the west a much larger basin, all nearly landlocked, and easily defended from the rugged hill of Munichia. The advantages of Piræus were first seen by Themistocles; and the fortification of the peninsula was completed soon after the Persian wars. The harbors were connected with the city by the 'long walls' at first so built as to include Phalerum, though later the southern wall was abandoned and a new one built close to the northern, furnishing connection with Piræus alone, which had become the only important harbor.

The earliest city was undoubtedly on the Acropolis, where excavations have shown a 'cyclopean' wall like those of Tiryns and Mycenæ, and remains of a palace and dwellings of the Mycenæan Period. The town seems also to have extended down the west slope into the valley at the foot of the Pnyx, and probably along the south side for some distance; and this lower city was also inclosed by a strong wall with nine gates, probably nine separate lines of defense reaching to the summit of the hill. A part of this ancient settlement, including various sanctuaries, was regarded in later times as sacred ground, the so-called Pelargicon. There were also ancient settlements along the Ilissus, where later were some of the most revered sanctuaries, and apparently also on the hills to the west of the Acropolis, where there are many foundations for small houses, cisterns, and steps cut in the rock. These dwellings were outside the later walls and were abandoned before the Fourth Century B.C., as graves of that period have been found inside the earlier houses. Close to the Acropolis on the northwest is the bare rock of the Areopagus (q.v.), and farther to the west and southwest, across a valley runs a long ridge, crowned at the south by the Hill of the Muses, with the monument of Philipoppus, erected at the beginning of the Second Century A.D., and at the north by the Hill of the Nymphs, the site of the modern astronomical observatory. Between the two is the Pnyx Hill, where was the ancient place of assembly. In the earliest times the Acropolis and its neighboring walls formed the only fortification, and it is still a disputed point whether there were any other defenses at the time of the Persian wars. The evidence renders it not improbable that there was an outer wall at that time, but the extent inclosed by it cannot be determined. We only know that it was much less than the space inclosed by the wall of Themistocles, built in great haste immediately after the Persian wars (B.C. 479). The course of this wall seems to have been preserved in later times, and can be traced in places by remains of the foundations, by the nature of the ground, and by the presence of graves, which in later times were always outside the walls. Its exact line, however, cannot be determined. Under the Emperor Hadrian the limits of the city seem to have been extended on the east so as to include the Olympieum (see below), and that portion of the city now occupied by the palace and its gardens. The line of the ancient wall in this region is probably marked by the Gate of Hadrian.

The Acropolis was the religious centre of the city, and before the time of Pericles was given up to temples and shrines. The site of the old royal palace seems early to have been marked by a temple of Athena, the patron goddess of the city, which was adorned by the Pisistratidæ with a colonnade, the gables of which were filled with sculptures representing the battle of the gods and giants. A part of these sculptures, valuable as illustrating the art of the close of the Sixth Century B.C., have been pieced together from fragments discovered during the excavations. Probably to the same time as this temple belong the foundations of an ancient gateway, set at an angle to the present line of ascent. The temple and all the other buildings on the Acropolis were destroyed by the Persians (B.C. 480-479) and were certainly never entirely rebuilt, though it is believed by some that the cella

ATHENS—RESTORATIONS





1. THE ACROPOLIS.

2. THE AGORA.

(q.v.) of the old temple was reërected and remained standing even into Roman times. Under Themistocles, Cimon, and Pericles the work of reconstructing the Acropolis was carried forward. On the south side a lofty retaining wall was built, and the ground filled in so as to form a terrace at the level of the old summit, and on this terrace was erected the Parthenon (q.v.), the chief glory of Athens and even in its ruins the most perfect specimen of Greek architectural genius. The present building was erected on the site of a temple begun by Themistocles or Cimon, and seems to have been completed about B.C. 437. North of the Parthenon, close to the site of the old temple was built the Erechtheum (q.v.), containing probably the ancient statue of Athena Polias, said to have fallen from heaven, the sacred olive of Athena, and the salt spring where Poseidon smote the rock with his trident. Near the west end stood the colossal bronze statue of Athena Promachos, erected by the Athenians as a memorial of the victories over Persia.

Northeast of the Parthenon was the great altar of Athena, and near by was erected later a temple of Augustus and Rome: On the south side of the Acropolis, west of the Parthenon, were sacred precincts, dedicated to Athena Ergane (the worker) and Artemis Brauronia. At the west end of the Acropolis, where alone the rock permits an easy ascent, stood the great gateway, the Propylæa (q.v.), begun in B.C. 437, and never completed according to the original plan. Just outside the Propylæa, on a high platform, reached now from the upper part of the Acropolis, but in ancient times also accessible by a staircase outside the gate, stood the little Ionic temple of Athena Nike, less correctly called that of 'Wingless Victory.' All these buildings were of white Pentelic marble and richly decorated with gilding and color. At the foot of the steep precipice on the northeast side of the Areopagus is a cave with a pool of dark water, which is believed to have been the site of the shrine of the Eumenides (q.v.), and the region west of the Acropolis and south of the Areopagus probably contained other temples, of which all traces have disappeared. Farther down the slope toward the west, in the valley between the Pnyx and Areopagus, has been discovered an ancient street, which evidently led from the market-place to the Acropolis. It was lined with private houses and shrines. On the slope of the Areopagus was a large sacred inclosure, containing wine-vats, and apparently dedicated to Dionysus, as it contained a long inscription with various regulations of the Iobacchæ, a society of worshipers of that god. At the foot of the Pnyx were many wells and chambers for collecting water, and there are traces of a large fountain, to which water was brought by an underground channel from the upper Ilissus along the south side of the Acropolis. This is held by many archæologists to be the work of Pisistratus and to mark the site of the Enneacrunos, or fountain with nine streams, erected by him over an open spring, Callirrhoë. Others, however, maintain that the evidence favors placing Callirrhoë and the Enneacrunos at a point in the bed of the Ilissus, where abundant springs are still found.

Passing from the gate down to the south side of the Acropolis, we find at the west end the Odeum of Herodes Atticus (see ATTICUS HERODES), which is still well preserved. Adjoining this was the long stoa, or portico built for the Athenians by Eumenes II., King of Pergamum (B.C. 197-159). Back of the stoa on a terrace at the foot of the steep cliff of the Acropolis lay the sanctuary of Asclepius, containing his temple and altar, and colonnades and other buildings for the sick, who came thither for healing. In a cave inside the sacred ground was a spring, still supposed to possess curative powers, and dedicated to the Virgin. East of the Asclepieum and the Stoa of Eumenes was the great theatre of Dionysus, with its seats partly cut in the solid rock, and back of its stage buildings the temple and precinct of the god in whose honor the plays were performed. On the north side of the Acropolis lay many public buildings, but this region is still thickly populated, and only the caves of Pan and Apollo high in the northwest corner of the Acropolis have been thoroughly excavated. North of the Areopagus lay the great market-place, surrounded with colonnades and public buildings, and near by Hadrian built a large gymnasium and baths, considerable remains of which can still be traced.

The most notable building of ancient times in this portion of the city is the so-called Theseum, a well-preserved hexastyle peripteral temple in the Doric style (104 feet by 44 feet), situated on a slight eminence north of the Areopagus, and west of the market-place. The name is certainly wrong, as the sanctuary of Theseus was in another part of Athens, and was a large inclosure; but the true name of the building is still uncertain, though modern archæological opinion tends in favor of the temple of Hephæstus, which must have stood in this quarter of the city. The Theseum was built about the same time as the Parthenon, and probably somewhat earlier, though on this point authority is divided. Of the pediment sculptures no trace remains, but at the east end of the portico are sculptured metopes, and across each end of the cella is a frieze in relief. The metopes represent the labors of Heracles and Theseus; the subject of the west frieze is the battle between the Centaurs and Lapithæ, and that of the east a battle in the presence of six seated gods. During the Middle Ages the building was changed into a church, but with little change of the exterior. Outside the Themistoclean Wall to the southeast of the Acropolis was the great temple of Olympian Zeus, begun by Pisistratus, but long left unfinished. About B.C. 174 Antiochus Epiphanes of Syria completed, or rather rebuilt, the temple, on a scale of magnificence which led Livy to say that, though unfinished, it was the only one on earth corresponding to the greatness of the god. The great platform measures 676 feet by 426 feet, and on this the architect Cossutius erected a temple 354 feet by 135 feet, measured on the upper step of the stylobate. It had three rows of eight Corinthian columns at each end, and two rows of twenty columns each at the sides, counting the corner columns twice. The magnificent scale of the work again delayed its completion, and it was not till the second visit of the Emperor Hadrian (A.D. 129) that it was finally dedicated. At present only 16 columns remain, one of which lies where it was prostrated by an earthquake. These columns are 56 feet 7 inches high and 5 feet 7 inches in diameter at the base, with 24 flutings. Excavations have brought to light the foundations of the earlier temple of Pisistratus.

Not far from the Olympieum, across the Ilissus, was the Stadium, laid out in a hollow between low parallel hills. The ground inclosed by the seats is 670 feet long by 109 feet wide. The Stadium seems to have been constructed by the orator Lycurgus, about B.C. 330, but was later rebuilt in white marble by Herodes Atticus, about A.D. 140. Most of this structure was burned for lime during the Middle Ages; but at the celebration of the Olympic Games in 1898 it was refitted, in part with marble, by the liberality of M. Averoff, a Greek of Alexandria.

For the topography and monuments of ancient Athens, consult: Stuart and Revett, *Antiquities of Athens* (London, 1762-1816); Leake, *Topography of Athens* (London, 1841); Wachsmuth, *Die Stadt Athen im Alterthum* (Leipzig, 1874-90); Harrison and Verrall, *Mythology and Monuments of Ancient Athens* (London, 1890); Curtius, *Stadtgeschichte von Athen* (Berlin, 1891), which contains a very valuable classified collection of ancient passages relating to this subject by Milchhöfer; Frazer, *Pausanias*, Vols. I., II. (London, 1898). Pausanias (q.v.) gives an account of the monuments of Athens in his day, and the works of Frazer and Miss Harrison include a translation of his text and full commentary. Valuable also is the work of Lolling in Müller's *Handbuch der klassischen Altertumswissenschaft*, Vol. III. (Nördlingen, 1889); and Milchhöfer in Baumeister's *Denkmäler des Klass Altertums*, Vol. I. (Munich, 1885). For the Acropolis, consult: Bötticher, *Die Akropolis von Athen* (Berlin, 1888), and Miller, in *American Journal of Archæology*, Vol. VIII. (Baltimore, 1893); also, Curtius and Kiepert, *Atlas von Athen* (Berlin, 1878). Athenian history is treated in the general histories of Greece. Aristotle wrote on the Constitution of Athens, and his work, first published in 1891, has been translated by Kenyon (London, 1891). Other important works are: Botsford, *Development of the Athenian Constitution* (Boston, 1893); and Wilamowitz-Möllendorf, *Aristoteles und Athen* (Berlin, 1893). For Athens during the Roman period and later, consult: Finlay, *History of Greece* (Oxford, 1877); Hertzberg, *Athen* (Halle, 1885). Other works of special value are: Laborde, *Athènes aux XVème, XVIème, et XVIIème siècles* (Paris, 1855) for its collection of documents; Gregorovius, *Geschichte der Stadt Athen im Mittelalter* (Stuttgart, 1889). Consult also: Dyer, *Ancient Athens* (London, 1873); C. Wordsworth, *Athens and Attica* (London, 1869); Symonds, *Sketches in Italy and Greece* (London, 1882); Freeman, *Historical Essays*, Series III. (London, 1892); Horton, *Modern Athens* (New York, 1901); Bikelas, "L'Athènes d'aujourd'hui," in *Revue d'études grecques*, No. XI. (Paris, 1898); Ferguson "Bibliography of Works Referring to Athens," in *The Athenian Secretaries* (New York, 1898).

ATHENS. A town and county-seat of Limestone County, Ala., about 85 miles north of Birmingham, on the Louisville and Nashville Railroad (Map: Alabama, C 1). Population, in 1890, 940; in 1900, 1010. During the Civil War, while held by Federal forces, it was twice attacked by the Confederates. On September 23, 1864, Colonel Campbell, with 600 Federal troops, surrendered to General Forrest, at the head of a large force of Confederate cavalry. The Confederates soon evacuated, however, and, on October 2-3, a small Federal force under Colonel Slade repulsed the attack of a superior Confederate force under General Buford.

ATHENS. A city and the county-seat of Clarke County, Ga., on the Oconee River, 73 miles east by north of Atlanta, and on the Southern, the Central of Georgia, the Georgia, and the Seaboard Air Line railroads (Map: Georgia, C 2). The city is an important cotton market, and contains several cotton mills besides other manufactories. Here are situated the University of Georgia, opened in 1800, the Georgia State College of Agriculture, organized in 1872, the Lucy Cobb Institute for Girls, and a State normal school. The city owns and operates its water-works. The government is vested in a mayor, elected for two years, and a city council. Athens was founded, as the seat of the State University, in 1800. Population, in 1890, 8639; in 1900, 10,245.

ATHENS. A village, the county-seat of Athens County, Ohio, 40 miles southwest of Marietta, on the Hocking River, and on the Baltimore and Ohio Southwestern, the Toledo and Ohio Central, and other railroads (Map: Ohio, F 7). Athens has manufactures of lumber and brick. It is the seat of the Ohio State University, opened in 1809, and of a State asylum for the insane. Settled in 1797, and incorporated in 1811, Athens is governed, under a charter of 1828, by a mayor, elected every two years, and a village council. The water-works are owned and operated by the municipality. Population, in 1890, 2620; in 1900, 3066. Consult C. M. Walker, *History of Athens County* (Cincinnati, 1869).

ATHENS. A town and county-seat of McMinn County, Tenn., 56 miles northeast of Chattanooga, on the Southern Railway (Map: Tennessee, G 5). It is the seat of the U. S. Grant University (Methodist Episcopal), opened in 1867, contains a fine court-house, and has planing, cotton, and woolen mills, etc. Athens was incorporated in 1868. Population, in 1890, 2224; in 1900, 1849.

ATHENS. The county-seat of Henderson County, Tex., 75 miles southeast of Dallas, on the Saint Louis Southwestern and the Texas and New Orleans railroads (Map: Texas, G 3). It is in a region adapted to cotton, fruit, and vegetable growing, which contains deposits of coal. It has cotton gins, cotton-seed oil mills, and extensive manufactures of pottery, and brick and tile. Population, about 3000.

ATHENS OF AMER'ICA, The, or The Modern Athens. A name given to Boston, Mass., in the day of her literary preëminence, and still hers by reason of a fine appreciation of culture, notwithstanding that the literary centre has shifted.

ATHENS OF THE NORTH, The. A complimentary title sometimes applied to Edinburgh on account of its intellectual distinction—a title formerly better deserved than now. The name is suggested, too, by the picturesqueness of the site, and by a certain classical grace, as along Princes Street. Copenhagen is another European city so styled.

ATHENS OF THE WEST, The. The title bestowed upon Cordova (q.v.), the Spanish seat of Arab culture in the Middle Ages.

ATH'ERO'MA (Gk. ἀθήρωμα, *athērōma*, a tumor full of gruel-like matter, from ἀθήρη, *athērē*, groats, meal). A yellow, cheesy material, composed of fat, cholesterin, sebaceous matter, albumen, chalk, and detritus of epithelium, found in cysts (as of the scalp) and in degenerated arterial walls. See ARTERIO-SCLEROSIS; ARTERY.

ATH'ERTON. A manufacturing and mining town in Lancashire, England, 4½ miles southwest of Bolton. The civic spirit is exemplified by the municipalization of water, gas, and electric lighting and traffic plants, and the erection of a dust destructor and public offices. Population, in 1891, 13,700; in 1901, 16,200.

ATHERTON, CHARLES GORDON (1804-53). An American politician, born in Amherst, N. H. He graduated at Harvard in 1822, and was a member of the State Legislature for five years and Speaker of the Lower House for four. In 1837 he was elected to Congress and served in the House in 1837-43, and in the Senate in 1843-49 and in 1852-53. In December, 1838, he introduced the notorious 'Atherton-gag' resolution, prescribing that 'all petitions relating to slavery, or to its abolition, be laid on the table without debate.' This measure was stubbornly fought by John Quincy Adams, who insisted on the 'right of petition;' but it was passed by a vote of 120 to 73, and remained in effect until 1844. See GAG RULES.

ATHERTON, GERTRUDE FRANKLIN (1859—). An American author. She was born at San Francisco, Cal., and was educated at secondary schools and privately. She began literary work in 1888, and in 1895 settled in London. Her books of fiction, which have found greater favor in England than in America, have their background chiefly in the Spanish mission days of California, and include, *The Doomswoman* (1892); *A Whirl Asunder* (1895); *Patience Sparhawk* (1897); *The Californians* (1898); *American Wives and English Husbands* (1899); *Senator North* (1900), whose sensational social ethics were vehemently approved and as vehemently condemned: *The Aristocrats* (published anonymously, 1901); and *The Conqueror* (1902).

ATHERTON RES'OLU'TIONS. See GAG RULES.

ATH'LETE, THE. A statue representing the typical proportions of the Greek athlete, a copy of the Doryphorus (spear-bearer) of Polycletus. It was found in the so-called Curia Isiaca at Pompeii, and is now at Naples in the Museo Nazionale.

ATHLET'ICS (from Gk. ἀθλητής, *athlētēs*, contestant). The term has of late been definitely applied to recognized contests of physical skill and endurance, for pastime and for the development of bodily strength. These are commonly divided into two classes—track and field games, and gymnastic performances. The former include the running or walking of various distances, hurdling, high and broad jumping, pole-vaulting, throwing the hammer and weight, and putting the shot. The latter comprise the use of Indian clubs, dumbbells, parallel and horizontal bars, weight-lifting, rope-climbing, tug of war, and various exercises in vaulting over fixed objects.

Athletic games were brought to a high development among the Greeks, and a class of professional athletes grew up, who began their training when scarcely out of boyhood. They were obliged to submit to a rigorous discipline, including careful avoidance of excesses, a special diet, regular exercise, and the cultivation of courage, self-control, and resourcefulness. There were at all times among the Greeks those who practiced athletic exercises from pure love of sport; but when these ancient amateurs competed in the games, they preferred running, jumping, and javelin-throwing, where natural vigor might take the place of long exercise. In later times the athlete was a huge mass of flesh and muscle, as may be seen in the mosaic from the Baths of Caracalla, or even in the fine realistic bronze statue of a pugilist in Rome, or the brutal head of a boxer from Olympia. Under the Roman Empire we find the professional athletes organized into corporations. (See GAMES, ANCIENT.)

Of the Britons before the Roman conquest we know that they were bold, active, and capable of bearing great fatigue. The Romans drafted the strongest of them into military service, and by the introduction of luxurious habits debilitated the weaker ones who were left at home. The later infusion of the new blood of the Teutonic tribes corrected this tendency and brought with it a new love of athletic contests. Wherever a Scandinavian leader has left a tradition at all, it is one relating to his feats of strength and agility. Thus Olaf Tryggeson, an early king of Norway, boasted that he could walk round the outside of his boat upon the oars as the men were rowing; that he could hurl two spears at once, one from either hand, and that he excelled all men in archery and swimming. In the later Saxon Period, such exercises as inured the body to hardship and fatigue constituted the chief part of the education of youth. With the introduction of the Norman influence and the tendencies of the age of chivalry, tournaments, jousts, and other contests of personal skill and prowess were the principal diversion of the upper classes. The sons of citizens and yeomen had their sports as well; they fought with clubs and bucklers and ran at the quintain on every village green, and contended with poles on the ice in winter, "not always without hurt," as Fitzstephen says, "for some break their arms and some their legs, but youth, emulous of glory, seek these exercises." With the decay of chivalry a great change took place toward the end of the Fifteenth Century, and exercises requiring the exertion of muscular strength went out of fashion to such an extent that the Government thought it necessary to interfere. A proclamation of Henry VII., after reciting that "it ever hath bene of old antiquitie used in this realme for all lustye gentlemen to pass the delectable season of summer after divers manner and sundry fashions of disport," establishes a series of exercises with prizes to be contested for in open competition. His successor, Henry VIII., added example to precept in his younger days, and daily amused himself in casting the bar, wrestling, fencing with swords and battle-axes, throwing the hammer, and similar recreations, in which few could excel him. Such pastimes, with broad jumping and running were, according to the authority of Thomas Wilson in *The Arte of Rhetorique* (1551), "the necessary accomplishment of a man of fashion." James I.

formulated a set of rules for his son, with the very modern conclusion that "bodily exercises are very commendable, as well for the banishing of idleness as for the making the body able and durable;" adding in a passage of the true spirit, "the exercises I would have you to use, although but moderately, *not making a craft of them*, are running, leaping, wrestling, fencing, playing at the caitch or tennise, archerie, palle-malle, and such like other fair and pleasant field games." The troublous times of the Rebellion, with the prejudice of the Puritans against all that had gone to make appropriate the title of "Merry England," and the dissoluteness of the court of Charles II., tended to destroy the old athletic spirit, except in the country villages, where the old games lingered. Otherwise during the Eighteenth Century and the early part of the Nineteenth, athletics dwindled well-nigh to extinction, and the moral and physical condition of the youth of England suffered to a proportionate extent.

Fortunately, about the year 1850, an athletic revival occurred in England affecting all branches of sport, furthered not a little by the energetic deliverances of Charles Kingsley and his school in favor of 'muscular Christianity.' Athletic games of a sort had been established early in the century at the Royal Military College, Sandhurst. In 1837 the Rugby Crick run began, and soon afterwards regular games were held also at the Woolwich Military Academy and a number of the great public schools. Probably the first athletic sports held in modern fashion occurred at Exeter College, Oxford, in 1852; they included sprints and long-distance running, followed later by jumping, hurdling, and weight events. The movement rapidly spread, and athletic clubs began to be formed. The Cambridge University games were established in 1857, and the Oxford games three years later. The inter-university boat-race dates from 1856 as an annual event; there had been a university boat club at Oxford since 1839. In 1864 the Oxford and Cambridge track and field games were established. The events of the first meeting were 100 yards, 440 yards, and one mile runs; high and broad jumps; 120 yards and 200 yards hurdle-races; and a steeplechase. Within the decade 1850-60 athletic meetings became a regular feature of school and college life, and through their influence amateur athletic sport became general throughout the kingdom. The London Athletic Club dates from 1866 (though it really grew out of a smaller organization of three years earlier), and the national amateur championships were established in the same year. The latter were for some years managed by the Amateur Athletic Club, whose attempt to become the regulating amateur organization subsequently failed. In 1880 the Amateur Athletic Association was founded as the national governing body for England. It is allied with the Scottish and Irish Amateur Associations and with the British swimming and cycling associations. The national championships now consist of 100 yards; 440 yards, half-mile, mile, and four-mile runs; 120 yards hurdles; high and broad jumps; hammer-throwing and weight-putting; pole-vaulting; four-mile walk; and two-mile steeplechase. A ten-mile championship run is also held in the spring. The Oxford and Cambridge sports include the first ten of the above events, substituting a three-mile for the four-mile run. Other important English events are the London Athletic Club and Putney Athletic Club games, the Civil Service, the United Hospitals, and the Railway Clearing-house sports. Cross-country running is very popular and has made Englishmen the best of long-distance runners.

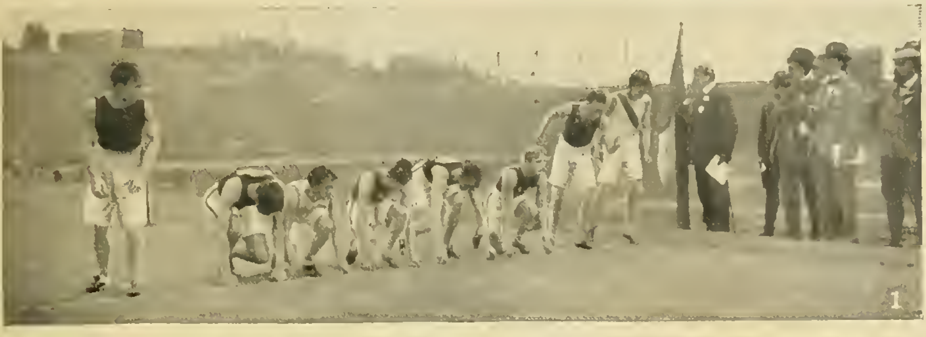
American and International Athletics. Athletics became popular in the United States in the early seventies. A movement soon arose to bring them under definite organization, and about 1880 the National Association of Amateur Athletes of America was formed, out of which has grown the present governing body. In America, as in England, the colleges exert an important influence on amateur athletics. College training methods are on the whole more scientific than those of the majority of athletic clubs, and most of the leading athletes come from the colleges. Their governing bodies are the Intercollegiate Association of Amateur Athletes of America and the Western Intercollegiate Association. Allied with them is the national body, the Amateur Athletic Union, with its eight sectional groups. It aims to maintain a uniform test of amateur standing, and in various ways to improve and promote sport. Its authority is universally recognized; besides track and field athletics, it claims jurisdiction over a few other sports. Contests have been held between representative American and English athletes on both sides of the Atlantic for over half a century, a full description of which will be found in an article in *Outing* for July, 1900, by the late William B. Curtis.

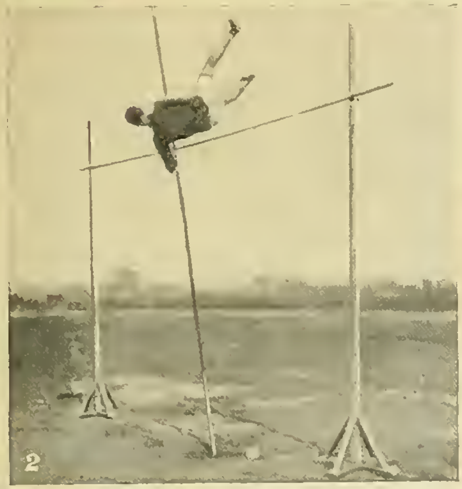
Consult: Anderson, *The Making of a Perfect Man* (New York, 1901); Sargent, *Athletic Sports*, Outdoor Library (New York, 1897); Cornish, *All-Around Athletes*, Spalding's Athletic Library (New York, 1898); James, *Practical Training* (New York, 1897); Murphy, *College Athletics* (New York, 1894); Dowdwig, *Games in Preparatory Schools* (London, 1900). Consult also the books in the Badminton Library on various branches of athletics. See, further, articles in this Encyclopædia on the branches of athletics, as, for example, Baseball; Field Sports; Football; Rowing; Basket Ball, etc.

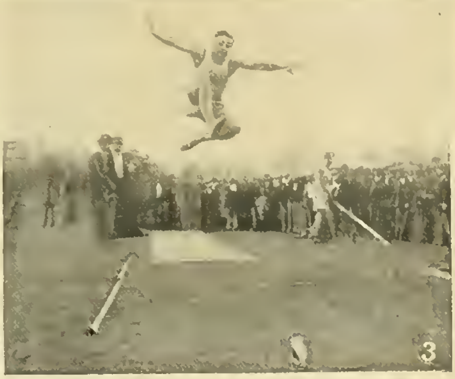
ATHLONE, ăth-lōn'. A market-town of Ireland, on both sides of the Shannon, 75 miles west of Dublin, in the counties of Westmeath and Roscommon (Map: Ireland, D 3). The chief manufactures are felt hats, friezes, linens, and stays. A canal here, a mile long, enables large river steamers to navigate the Shannon for 116 miles from Killaloe to Carrick-on-Shannon, uninterrupted by the river rapids. The Shannon is crossed by a fine iron bridge. Athlone is one of the chief military positions in Ireland. The fortifications cover 15 acres and contain barracks for 1500 men. Population, about 7000. During the last attempt of James II. to recover his throne in 1690, Athlone suffered two sieges, and was finally taken by assault.

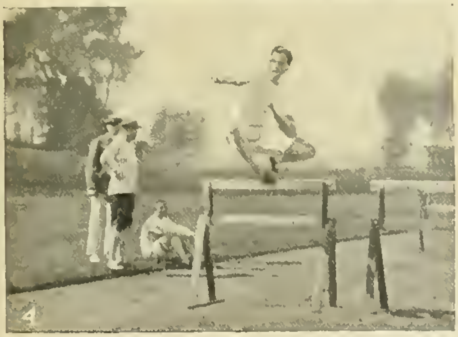
ATHOL, ăth'ŏl. A town in Worcester County, Mass., 32 miles west of Fitchburg, on the Fitchburg and Boston and Albany railroads (Map: Massachusetts, C 2). It has a public library and manufactories of shoes, mechanical tools, silk, lumber, etc. Town meetings are held to make appropriations for roads, bridges, etc., executive

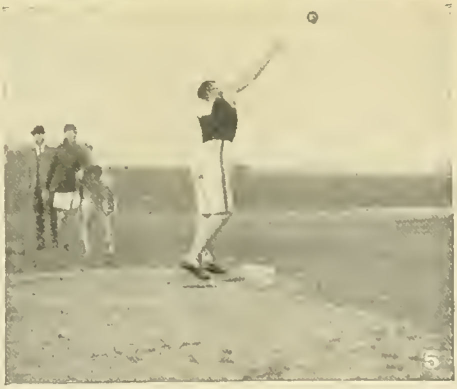
ATHLETICS

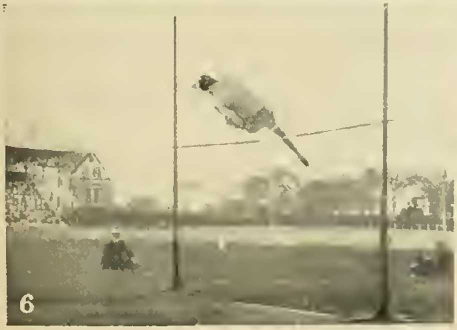


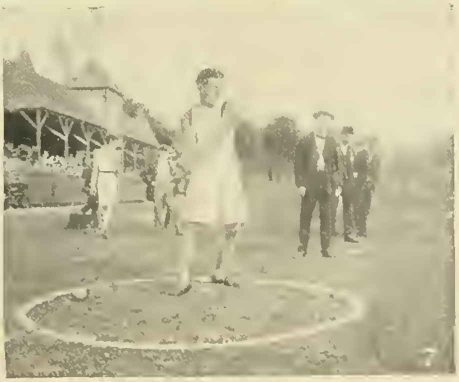












1. SPRINTERS, showing different styles of starting.
2. POLE VAULTING.
3. BROAD JUMP.
4. HURDLING.
5. PUTTING THE SHOT.
6. HIGH JUMP.
7. THROWING THE HAMMER.

functions being in the hands of selectmen. Population in 1890, 6319; in 1900, 7061. Athol was first settled in 1735 and was called Pequoig until 1762, when it was incorporated as a town under its present name. See *History of Worcester County* (2 vols., Boston, 1879).

ATHOR, ä'thôr, **ATHYR**, ä'thĭr, or **HATHOR**, hä'thôr (Egyptian *Hat-hor*). An Egyptian goddess. The original seat of her cult seems to have been Denderah in Upper Egypt, where the ruins of her famous temple are still to be seen, but at a very early period her worship spread over the whole of Egypt. Her primitive fetish was, apparently, a buffalo's skull raised on a pole, and from this was developed the sacred Athor column, which plays an important part in Egyptian architecture, bearing, as capital, a female head with the ears of a cow. The same head forms the central ornament of the *sistrum*, or rattle for temple music, which appears among the insignia of this goddess. In later times Athor was regarded as the goddess of music and the dance, of joy and love. By the Greeks, she was identified with Aphrodite (Venus). Earlier, however, she was conceived as a cosmical divinity, typifying the sky, and the traditional explanation of her name as meaning 'the house of horns' (i.e. of the sun) is a result of this conception. The world is frequently represented in the form of her sacred animal, the cow, bearing between her horns the sun-god or his disk. In Egyptian mythological texts, Athor is sometimes called the mother of the sun, which is daily born from the sky. As the nocturnal sky, she became the goddess of the dead, and, under the latest dynasties, deceased women were supposed to become Athor, just as deceased men became Osiris. The representations of Athor vary greatly. Usually she is depicted in the form of a woman with a cow's head. The third month of the Egyptian year (Athor) was named for this goddess. For illustration, see EGYPT.

ATH'OS (Gk. *Ἄθως*, called in modern times *Ἅγιον Ὄρος*, *Hagion Oros*, by the Greeks, and Monte Santo by the Italians, the name signifying Holy Mount). Properly the highest elevation on the easternmost of the three Chalcidian peninsulas. In a broader sense of the word the whole peninsula was called Athos. The peninsula is about 40 miles long and is connected with the mainland by an isthmus hardly a mile and a half broad. It contained in ancient times several towns, and the mountain Athos (6349 feet) is at its southern extremity. The point was a perilous one for sailors, and Xerxes, when planning the invasion of Greece, ran a canal through the isthmus, traces of which are still to be seen. Mount Athos has been since the Middle Ages the seat of a monastic republic, which, at the present time, consists of twenty monasteries and about 6000 monks. The origin of some of these religious houses is dated by legend as far back as the time of Constantine. In the Thirteenth Century they were pillaged by the Latin conquerors of Constantinople, but recovered under the succeeding emperors. In recent times, they have through three centuries of Moslem rule preserved their independence and former privileges. In the Middle Ages they were the centre of Greek learning and they have furnished to scholars many valuable Greek manuscripts, but at the present day there is a universal lack of learning among the monks of these establishments. Consult: Curzon, *Monasteries in the Levant* (London, 1881); A. Neyrat, *L'Athos* (Paris, 1880); Athelstan Riley, *Athos* (London, 1887); and Brockhaus, *Die Kunst in den Athos-Klöstern* (Leipzig, 1891).

ATHOS, ȧ'tôs'. The *nom-de-guerre* of a character in Dumas's *Musketeer* romances, whose real name in the story was the Comte de la Fère. He is one of the three guardsmen with whom d'Artagnan (q.v.) associates himself—the husband of the infamous 'Miladi,' and father of the Vicomte de Bragelonne, who gave his name to the last book of the trilogy.

ATHWART', ATHWART'SHIP. See BEARING.

ATHYR, ä'thĭr. See ATHOR.

ATITLAN, ä'tē-tlän'. A lake situated in the Department of Solola, Guatemala, 4700 feet above the sea-level, over 24 miles long and 10 miles wide, with a circumference of 64 miles (Map: Central America, B 3). It has a depth of more than a thousand feet, is surrounded by steep declivities, and has no visible outlet, though many small streams flow into it. At its southern end are two large volcanoes, San Pedro, 7000 feet high; and Atitlan, over 10,500 feet high.

ATITLAN, or **SANTIAGO DE ATITLAN**, sän'tē-ä'gō dȧ ȧ'tē-tlän'. An Indian town on the mountain lake of Atitlan, in the Department of Solola, Guatemala, 49 miles west of the city of Guatemala. It has mineral springs and cotton-spinning is an important industry. Population, 9000.

ATKARSK, ȧt-kärsk'. The capital of a district in the Government of Saratov, Russia; near the junction of the Medvieditza with one of its feeders (Map: Russia, F 4). It carries on a brisk trade in grain. Population, in 1897, 10,000. The settlement of Etkara is mentioned in the Fourteenth Century.

AT'KINSON, EDWARD (1827—). An American economist. He was born in Brookline, Mass., and was educated in private schools. For many years he managed manufacturing companies and afterwards conducted a fire insurance company for the mutual insurance of factories. He invented the 'Aladdin oven,' an improved cooking apparatus. He has contributed extensively to periodicals and has published many pamphlets and books on economic subjects, banking, railways, cotton manufactures, the tariff, money, fire prevention, and the nutritive value of foods. During the Presidential campaign of 1900 he was an active opponent of the Administration's policy of expansion. Among his more extended works are: *The Distribution of Products* (1885); *The Industrial Progress of the Nation* (1889); and *The Science of Nutrition* (10th ed., 1898).

ATKINSON, GEORGE FRANCIS (1854—). An American botanist. He was born at Raisinville, Monroe County, Mich., received his education at Olivet College, Michigan, and at Cornell University, and was made assistant professor of general zoölogy and entomology at the University of North Carolina in 1885 and professor of botany and zoölogy there in 1886. In 1889 he was appointed professor of biology at the Alabama Polytechnic Institute and at the Agricultural and Mechanical College of Alabama, and in 1892 accepted a call to Cornell University as professor of botany. His publications include several excellent text-books and treatises on botany and numerous papers in various scientific periodicals.

ATKINSON, John (1835-97). An American preacher. He was born at Deerfield, N. Y., and served in the ministry of the Methodist Episcopal Church till his death at Haverstraw, N. Y. He wrote the familiar hymn, "We Shall Meet Beyond the River," and the historical works, *Memorials of Methodism* (1860); *The Centennial History of American Methodism* (1884); *The Beginnings of the Wesleyan Movement in America, and the Establishment Therein of Methodism* (1896).

ATKINSON, John Christopher (1814-1900). An English clergyman and antiquary. He was born at Goldhanger, in Essex, where his father was curate. In 1838 he graduated B.A. from Saint John's College, Cambridge, and three years later was ordained curate of Brockhampton in Herefordshire. In 1847 he became vicar of Danby, in the North Riding of Yorkshire, where he resided till his death. In 1887 he received from Durham University the degree of D.C.L., and in 1891 he became a prebendary in York Cathedral. A delightful antiquary somewhat after the type of Gilbert White (q.v.), he is best known for his *Forty Years in a Moorland Parish* (1891). Among his other popular books are: *The Walks, Talks, Travels, and Exploits of Two Schoolboys* (1859); *Play-Hours and Half-Holidays* (1880); *British Birds' Eggs and Nests* (1861); and *The Last of the Giant-Killers* (1891). Among his learned works are: "A Glossary of the Dialect of the Hundred of Lonsdale," in *Transactions of the Philological Society* (1867); *A Glossary of the Cleveland Dialect* (1868) with *Additions* (1876); *The History of Cleveland* (incomplete, 1872-77). He also edited for the Surtees Society *Cartularium Abbathiæ de Whiteby* (1879); and *Cartularium Abbathiæ Rievalle* (1889).

ATKINSON, Thomas William (1799-1861). An English artist and traveler. He first devoted himself to architecture, but afterwards traveled extensively in western Siberia and published aeounts of his travels in works beautifully illustrated by himself. The works are entitled: *Explorations in Oriental and Western Siberia* (London, 1857), and *Travels in the Regions of the Upper and Lower Amoor* (London, 1860).

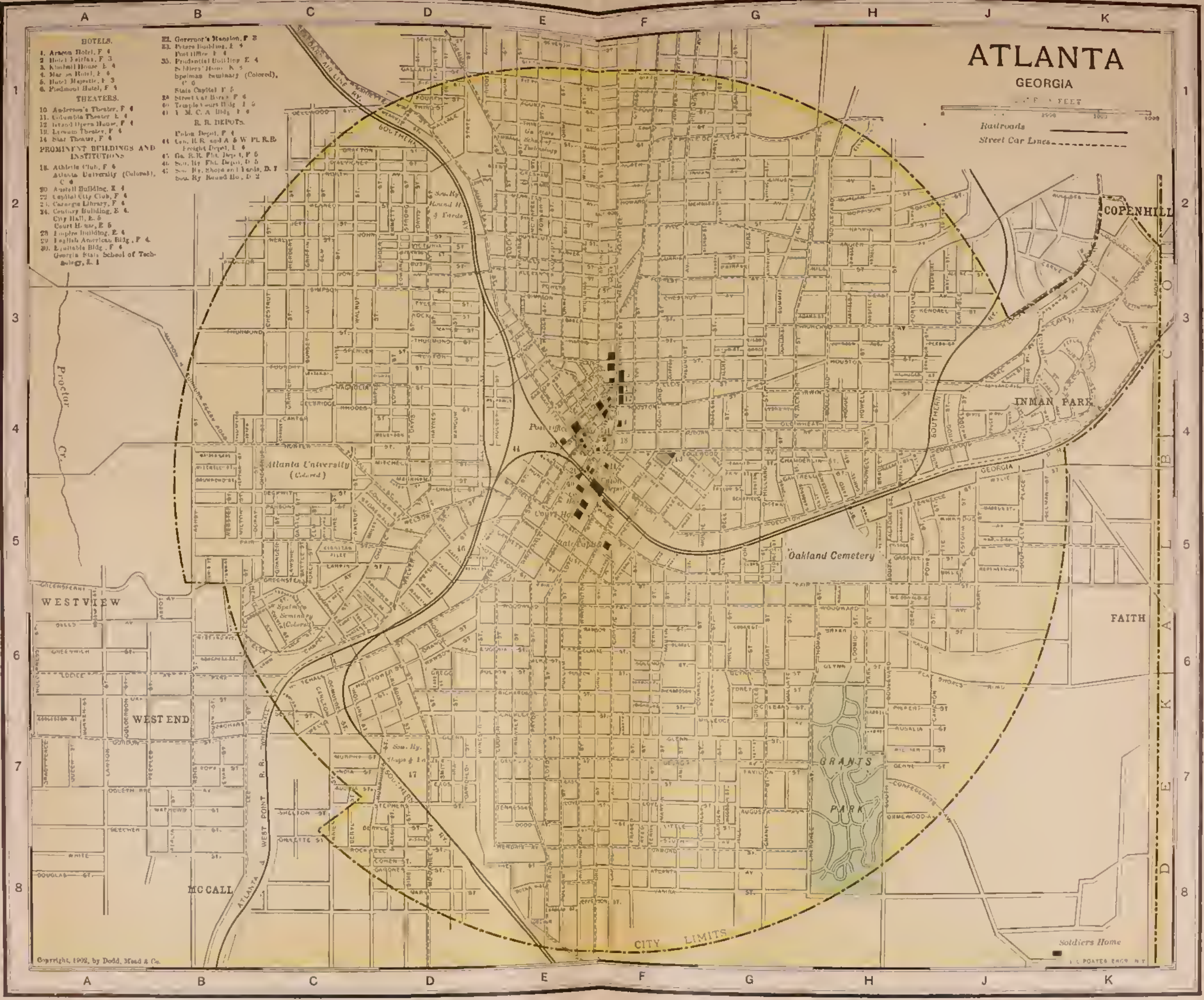
AT'KYNS, Sir Robert (1621-1709). An English jurist and Lord Chief Baron of the Exchequer. He was descended from a family of distinguished lawyers. In 1659 he entered Richard Cromwell's Parliament as member for Evesham, and was evidently of the King's party, as he was made Knight of the Bath at Charles's coronation (1661). He became Judge of the Court of Common Pleas in 1672, but, owing to his dissatisfaction with the court interference with the independence of judges, he resigned in 1679. When the case against Lord William Russell was instituted in 1683, Atkyns prepared two decisions which brilliantly demonstrated the groundlessness of the charge brought against that nobleman. Upon the accession of William III. he became Lord Chief Baron of the Exchequer, a position which he held until 1693. His *Parliamentary and Political Tracts* constitute a valuable contribution to the history of the time.

ATLAN'TA. The capital of Georgia, and county seat of Fulton County, 171 miles west by north of Augusta and 294 miles northwest of Savannah (Map: Georgia, B 2). It is popularly known as the "Gate City," and is the largest city in the State, the commercial metropolis of the northern section, and one of the important railroad centres of the South. It lies at the base of the Blue Ridge, near the Chattahoochee River, and has an elevation of 1000 to 1100 feet above sea level and a healthful climate with a mean annual temperature of about 60° Fahrenheit. The city is laid out in a circle and possesses a fine public library, the State Library with over 50,000 volumes, a valuable geological collection, and numerous educational institutions. It is the seat of the Georgia School of Technology (founded in 1888), a branch of the State University at Athens; Atlanta University, founded in 1869; Clark University (Methodist Episcopal), established in 1870; Atlanta Baptist College, organized in 1867; and two medical schools. Among the more important buildings are the State Capitol, court-house, city hall, customhouse, opera-house, chamber of commerce, and several commodious office buildings. Other points of interest are Grant and Piedmont parks, the latter being the site of the Atlanta Exposition of 1895. In the vicinity of the city are prosperous agricultural communities and popular suburbs; and Fort McPherson (q.v.), a Government army post, is four miles distant to the south.

Atlanta carries on a large export trade in cotton, tobacco, grain, horses, and mules, its mule market being one of the most important in the United States. The products of its industrial establishments include cotton goods, cotton-seed oil, bags, furniture, machinery, fertilizers, patent medicines, flour, street cars, agricultural implements, and various other foundry and machine-shop products.

The government is administered under a charter of 1874, revised in 1900, which provides for a mayor, who holds office for two years, and a bicameral municipal council; the board of aldermen, consisting of six members, elected at large for three years, and the council of fourteen members, chosen for two years to represent the city wards, but elected by the whole city. Of the administrative officials, only the license inspector and public weighers are appointed by the executive, the municipal council controlling appointments to all other offices except the following, which are filled by popular election: attorney, comptroller, commissioner of public works, marshal, engineer, tax collector, treasurer, and sexton. The annual income and expenditures of the city balance at about $1,800,000; the principal items of expense being $140,000 for the police department (including amounts for police courts, jails, reformatories, etc.), $105,000 for the fire department, $105,000 for the health department (including amounts for street cleaning and sprinkling, and garbage removal), and $150,000 for schools. Atlanta owns its waterworks, which are operated at a yearly cost of about $90,000.

Population: 1850, 2572; 1870, 21,789; 1890, 65,533; 1900, 89,872, including 2500 persons of foreign birth and 35,900 of negro descent. The first settlement was made here about 1839, and was



HOTELS.

1. Aragon Hotel, F 4
2. Hotel Fairfax, F 3
3. Kimball House, E 4
4. Marion Hotel, F 4
5. Hotel Majestic, F 3
6. Piedmont Hotel, F 4

THEATERS.

10. Anderson's Theater, F 4
11. Columbia Theater, E 4
12. Grand Opera House, F 4
13. Lyceum Theater, F 4
14. Star Theater, F 4

PROMINENT BUILDINGS AND INSTITUTIONS

18. Athletic Club, F 4
Atlanta University (Colored), C 4
20. Austell Building, E 4
22. Capital City Club, F 4
23. Carnegie Library, F 4
24. Century Building, E 4.
City Hall, E 5
Court House, E 5
28. Empire Building, E 4
29. English American Bldg., F 4.
30. Equitable Bldg., F 4
Georgia State School of Technology, E 1
31. Governor's Mansion, F 3
32. Peters Building, E 4
Post Office, E 4
35. Prudential Building, E 4
Soldiers' Home, K 8
Spelman Seminary (Colored), C 6
State Capitol, F 5
38. Street Car Barns, F 4
40. Temple Court Bldg., E 5
41. Y. M. C. A. Bldg., F 4

R. R. DEPOTS.

Union Depot, F 4
44. Cen. R.R. and A. & W. Pt. R.R. Freight Depot, E 4
45. Ga. R.R. Frt. Depot, F 5
46. Sou. Ry. Frt. Depot, D 5
47. Sou. Ry. Shops and Yards, D 7
Sou. Ry. Round Ho., D 2

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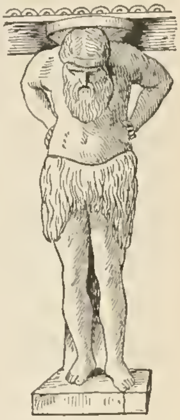
called Terminus, from its being the intended terminus of the Georgia Railroad, completed in 1845. In 1843 it was incorporated as a town under the name Marthasville, and two years later the present name was adopted, while in 1847 a city charter was secured. Atlanta's growth was very rapid, its population being about 15,000 in 1861, and, from its admirable location, it became, at the outbreak of the Civil War, one of the most important cities in the Confederacy, being used as a depot for supplies, a manufacturing centre, a shelter for refugees, and a rallying-place for recruits. In 1864 it was the objective point of General Sherman's campaign from Chattanooga (See Civil War in America.) The Federal army approached the city in July, and after fighting the battle of Peachtree Creek (q.v.), on July 20, closely invested the Confederate works. On July 22 the battle of Atlanta was fought southeast of the city, Hood, the Confederate general in command, making a bloody but unsuccessful attack on Sherman's extreme left under McPherson, who was killed early in the engagement. The Federal loss in killed, wounded, and prisoners was about 3500; the Confederate, never accurately determined, was probably as great as 8500. On the 28th another severe engagement, the battle of Ezra Church, was fought west of the city, Hood again attacking, and being again repulsed, the Federals losing about 600 and the Confederates about 4500. Meanwhile Sherman had kept up an almost continual bombardment, and on September 1, by a flank movement, compelled Hood to evacuate, the Federals taking possession on the following day. On the 4th, Sherman ordered all civilian residents to leave Atlanta within five days, and at the end of that time turned the city into a vast military camp. Here he stayed until November 15, when, leaving the larger part of the city in flames, he started for Savannah, on his famous march to the sea. Excepting its court house, churches, and a number of dwellings, Atlanta was almost totally destroyed; but after the war it was quickly built up anew, and grew with great rapidity. In 1878 it became the capital of Georgia, and in 1895-96 the celebrated Cotton States and Industrial Exposition was held here. For Atlanta during the Civil War, see Jacob D. Cox, *Atlanta* (New York, 1882), in the "Campaigns of the Civil War Series." For the general history of the city, see W. P. Reed (editor), *History of Atlanta* (Syracuse, 1889).

ATLANTA EX'POSI'TION, or Cotton States and Industrial Exposition. An exhibition held in Atlanta, Ga., from September 18 to December 31, 1895, having for its chief purpose the presentation of the agricultural, manufacturing, and mineral resources of the Southern States. The site selected was Piedmont Park, about two miles from the centre of the city, and covered an area of 189 acres, on which over thirty buildings, mostly in the Romanesque style of architecture, were erected. Among these buildings, devoted to the purposes indicated by their names, were the following: Administration, Agriculture, Auditorium, Electricity, Fine Arts, Manufactures and Liberal Arts, Machinery, Minerals and Forestry, Negro, Transportation, United States Government, and Woman's. In addition to special State exhibits by Alabama, Arkansas, California, Connecticut, Florida, Georgia, Illinois, Louisiana, Massachusetts, Mississippi, New York, North Carolina, Pennsylvania, South Carolina, Tennessee, and the District of Columbia, there were exhibits by the foreign governments of Austria, Belgium, Germany, Great Britain, Italy, Mexico, and Russia, and by several of the South American and Central American republics. The usual amusement features were collected on Midway Heights, and included Chinese, Guatemalan, Japanese, and Mexican villages that were of special interest. Numerous congresses were held during the Exposition, and to nearly every day was assigned some important feature that attracted special visitors. Among these were: Georgia Day, Confederate Day, Negro Day, etc. A Department of Awards, presided over by Daniel C. Gilman, president of the Johns Hopkins University, viewed the exhibits during the two weeks between October 15 and November 1. The total attendance was 1,179,889, and the cost of the Exposition was $960,930, while the receipts from the admissions were $500,000, from concessions $125,230, and from floor space $79,000.



ATLANTES, ăt-lăn'tēz (Gk. nom. pl. Ἄτλαντες; see Atlas.) Carved male figures used in architecture as supports to cornices, architraves, etc. They correspond to the female Caryatides, but were not so popular in Greek art. Examples are in the temple at Girgenti, the theatre at Athens, in minor parts of Mediæval decorative work, and especially, on a large scale, in late Renaissance buildings.

ATLAN'TIC. A city, the county-seat of Cass County, Iowa, 82 miles west-southwest of Des Moines, on the Chicago, Rock Island and Pacific Railroad (Map: Iowa, B 3). It has starch works, machine-shops, and other manufactures. Atlantic was incorporated in 1869; by the existing charter the mayor holds office for two years and the city council consists of eight members. Population, in 1890, 4351; in 1900, 5046.

ATLANTIC CA'BLE. See Atlantic Telegraph, History of.

ATLANTIC CIT'Y. A seaside resort, on a long, narrow, sandy island, known as Absecon Beach, in Atlantic County, New Jersey, 60 miles southeast of Philadelphia and 137 miles south by west of New York; on divisions of the Pennsylvania and the Reading railroads (Map: New Jersey, D 5). The island, three-quarters of a mile wide, stretches for 10 miles along the coast and is separated from the mainland by 4 or 5 miles of meadows, partly covered with water at high tide, and by a narrow strait. Absecon Lighthouse, 160 feet high, is on the north end of the beach. The city is well laid out, Atlantic Avenue being 100 feet wide; the streets are named after the States of the Union. A board walk skirts the ocean for four miles, forming a charming promenade; the boating and bathing facilities are good, and fishing and shooting are popular amusements; and hotels, boarding houses, and private cottages abound for the accommodation of visitors. The Atlantic City Hospital, Mercer Memorial Home for Invalid Women, and Children's Seashore Home are prominent institutions. The government is administered under a charter of 1902, which places the term of the mayor and practically all municipal officials, both elective and appointive, at three years, and secures to the city council enlarged legislative powers. The waterworks are owned and operated by the municipality. A few settlers came to the site of Atlantic City as early as 1780, but there were only seven houses standing in 1852, and the existence of the city and summer resort really dates from the completion hither of the Camden and Atlantic Railroad in 1854, when the name 'Atlantic City' was also first adopted. On April 3, 1902, Atlantic City suffered from a disastrous fire, which destroyed several hotels and smaller buildings, and the greater part of Young's Pier, a loss estimated at $1,000,000. By the terms of the new charter, all buildings hereafter erected within the municipal limits must be fireproof. Population, in 1890, 13,055; in 1900, 27,838. During the summer the transient population varies, but has been estimated at between 250,000 and 300,000.

ATLANTIC HIGH'LANDS. A borough and seaside resort, in Monmouth County, New Jersey, 20 miles south of New York, on Sandy Hook Bay and the Central Railroad of New Jersey (Map: New Jersey, D 3). It has beautiful residences and drives, and owns and operates its water-works and electric-light plant. Settled in 1880, Atlantic Highlands was incorporated in 1887. Population, in 1890, 945; in 1900, 1383.

ATLANTIC O'CEAN. An ocean so named from Atlas (q.v.), probably because it was the sea beyond Mount Atlas, in northwestern Africa. It lies to the west of the great land masses of the Old World and to the east of those of the New World, and extends from the Arctic to the Antarctic regions. It is bounded on the east by Europe and Africa, and on the west by the two Americas. On the north it freely connects with the Arctic Ocean by a channel which is as broad as the narrower parts of the main body of the ocean, but which is obstructed by islands, of which Greenland is the largest. Greenland lies to the west of the main connecting channel, which is itself obstructed by Iceland. On the south no natural line of demarcation separates the Atlantic from the Antarctic Ocean, and the waters of the Atlantic mingle with those of the Pacific at the southern end of South America, and with those of the Indian Ocean at the southern end of Africa.

The northern and southern boundaries of the Atlantic are therefore not fixed by any natural barrier, but it is the custom to assume the Arctic and Antarctic circles to be the limits on these two sides respectively, although the peculiar influences of the polar oceans extend considerably toward the equator from these limits. The length of the Atlantic between these north and south boundaries is over 9000 miles; the breadth averages perhaps something over 3000 miles, being only about 1900 miles in the narrowest place in the middle Atlantic between Cape Palmas, on the west coast of Africa, and Cape São Roque, on the east coast of South America. By the protrusion of the two continents in the equatorial zone the Atlantic is divided into two basins, the North and the South Atlantic.

The area of the Atlantic is about 30,000,000 square miles, without counting the seas which are branches of it: including these the area is not far from 35,000,000 square miles. The eastern and western borders are irregular in outline, but are peculiarly parallel. The main groups of islands in the Atlantic are the Arctic group, Iceland and Greenland at the north, the British Isles at the northeast, Newfoundland at the northwest, and the West Indies in the west-central part. Two pairs of great inland seas projecting from the North Atlantic cut into the two continents on either side—the Baltic and the Mediterranean on the eastern side, and Hudson Bay and the Gulf of Mexico on the western side. The only great embayment along the shores of the South Atlantic is the Gulf of Guinea. The Atlantic, including all its connecting inland seas, receives most of the drainage of northeastern, central, and southern North America, practically the whole of South America, most of Europe, except the eastern portion (Volga), and most of Africa except the southeastern part (Zambezi).

THE ATLANTIC BASIN. The Atlantic Basin deepens to a depth of about 13,000 feet, usually within a distance of 200 or 300 miles from the coast-line, and this may be taken as the average depth of the ocean floor beneath the water surface between latitude 50° N. and 50° S. To the northward of latitude 50° N. the depth of the floor is much less, ranging from only about 6500 to 13,000 feet, and this same highland extends southward, mainly as a comparatively narrow ridge, along the whole length of the ocean floor, approximately midway between the Eastern and Western continents. On either side the bottom sinks to depths of about 16,000 feet. In the South Atlantic this submarine plateau is known as the Challenger Ridge. There are a number of depressions in the ocean floor, the chief of which are those eastward of the United States, approximately in the longitude of Newfoundland, with a depth of 20,000 feet; northward of Porto Rico, 19,700 to 27,300 feet; and one eastward of Cape São Roque, 19,700 to 20,700 feet. The temperature on the ocean floors is about 35° F. in the North Atlantic, 35° to 37° in the equatorial regions, 32° to 34° in the western part of the South Atlantic, and 34° to 36° in the eastern part. The average temperatures of the ocean surface decrease in general from 80°-82° in the equatorial region to 52° in latitude 50°-60° N., and 32° in latitude 75° N., and 41° in latitude 47° S., and 32° in latitude 55° S. The surface temperatures follow the changes in atmospheric temperature, but vary much less in amount. The decrease in temperature with the depth of the water is, in lower latitudes, very rapid for a short distance below the surface; but below a depth of from 1800 to 2400 feet the change in temperature is slight.

The surface waters of the North Atlantic and the South Atlantic have each independent circulatory systems. The Gulf Stream, in the North Atlantic, flows from the Gulf of Mexico along the eastern coast of the United States, but in latitude 40° N. it loses its individuality and is merged with the general eastern surface drift. This latter spreads and divides, one branch of it flowing northward along the western coast of northern Europe, there, above latitude 70°, to join the colder currents flowing to the west: the other branch of it flowing southward along the western coast of southern Europe and that of northern Africa, there, below latitude 20° N., to join the warm westward current, and forming, between latitudes 10° and 45° N., a clockwise moving circulatory system. Off the western shores of the Atlantic the cold Arctic current flows southward from the north (called the Greenland Stream on the coast of Greenland and the Labrador Stream farther south), part of it branching off toward the east about latitude 50°, and forming a return current, completing another counter-clockwise system of circulation between latitudes 45° and 60° N.

In the South Atlantic there appears to be but a single great circulatory system, moving in a counter-clockwise direction. The sub-equatorial water-current flows westward across the Atlantic in the region of the equator, but on reaching longitude 25° W., it begins to separate, the northern branch moving toward the northwest along the Brazilian coast toward the Gulf of Mexico, and the southern branch moving toward the southwest and forming the Brazilian Stream along the eastern coast of Brazil; but it turns eastward beyond latitude 40° S. and flows across the Atlantic with the general eastward drift of those southern latitudes. As the coast of Africa is approached, a part of the stream turns northward and flows along the southern part of the western coast of Guinea, where it is known as the Benguela Current, to join again the westward current across the Atlantic near the equator. These various oceanic currents range in velocity from 20 to 75 miles per day.

The northern Atlantic lies in the path of the great procession of cyclones and anti-cyclones of middle latitudes, and also in the path of the West Indian hurricanes over its lower latitudes; the counterparts of these atmospheric disturbances are found in the South Atlantic. The winds of the Atlantic are divided into two systems, those of the North and South Atlantic. In January and February, in the North Atlantic, north of latitude 35°, the winds are chiefly from the west; they are northwest on the North American coast, west toward the middle, and southwest on the European coast; but between Iceland and Greenland there is an area of average cyclonic circulation (counter-clockwise). South of about latitude 35° N. the winds are generally from the northeast almost to the equator. In the South Atlantic, north of latitude 20° S., in the western part, and north of latitude 35° S., in the eastern part, the winds are from the southeast, becoming more distinctly from the south just at the equator. In latitude 30° S. the winds are from the south on the eastern side, and from the north on the western side; but southward of latitude 40° S. they are in general from the west. Over an area whose centre is about latitude 30° S. and longitude 10° W. there is a system of winds flowing counter-clockwise. In July and August the dividing lines between the wind systems of the North and South Atlantic are pushed farther northward by from 10° to 15°.

The mean annual rainfall over the Atlantic Ocean is in general from 60 to 80 inches between latitude 4° S. and 8° N.; between 10° and 30° N., 10 inches; from 30° to 40° N. it increases from 10 to 40 inches; in the middle ocean, from 42° to 58° N., 80 inches. South of the equator the rainfall is from 20 to 40 inches in the western part, but from 10 to 20 inches in most of the eastern part; and increases in the middle ocean from 20 to 40 inches from latitude 10° to 35° S.

The vegetable and animal life of the Atlantic is treated under the subject OCEAN LIFE.

The distribution of algæ is dependent on the light and temperature of the water, and so rapid is the decrease of the former that below a depth of from 800 to 1000 feet few algæ are found; those in the surface waters belong mainly to the Fucaceæ, and those at greater depths are mainly Ceraminaceæ. The chief feature of the flora which can receive mention here is the great Sargasso region between latitudes 24° and 30° N. and longitudes 40° and 80° W., where the seaweed *Sargassum bacciferum* is found in such great abundance as to interfere in some places with the progress of sailing vessels.

The distribution of mammalia, fishes, and floating mollusks is determined largely by the temperature of the surface waters. Of the cetacea, some species of whales are distributed over various sections of the Atlantic Ocean, but those found in polar regions do not descend to lower latitudes, and *vice versa*.

The ocean bottom, near the coasts, is covered with a great variety of deposits of continental waste. The great portion, that between depths of 3000 and 12,000 feet, is, however, covered with Foraminiferæ (*Globigerina, Orbulina, Pulvinulina, Sphæroidina*). At these latter depths the calcareous bottom is replaced by gray clay, which forms a transition region between the foraminiferan ooze and the red clay of the greater depths below 14,000 feet, which consequently covers a large area. The flora and the fauna of the regions of the Atlantic visited by the *Challenger* are given in minute detail in the *Report of the Challenger Expedition*, prepared under the direction of C. Wyville Thomson and John Murray (London, 1880-95). See OCEAN; OCEANIC DEPOSITS; DISTRIBUTION OF ANIMALS.

ATLANTIC TEL′EGRAPH, HISTORY OF THE. The construction of the trans-Atlantic cable followed as the result of the successful laying and operation of various shorter submarine lines. The first definite suggestion of telegraphic communication between England and America dates from 1845, when the Messrs. Brett, who a few years later were active in the construction of the first telegraph lines across the English Channel, registered a 'General Oceanic Telegraph Company.' Before proceeding with this enterprise, they successfully laid a cable across the English Channel (1851), which was of such excellent construction that it survived for a number of years. The success of this and other European cables led to the discussion of telegraphic communication between America and Europe by way of Newfoundland. The original plan was to carry the line across that island to Saint John's, and there intercept the incoming steamers, and by means of carrier-pigeons and a direct telegraph line to the United States, transmit messages. The coöperation of Cyrus W. Field was enlisted in 1854, and he became interested not only in this scheme, but also in a project of a trans-Atlantic cable, which he pushed with vigor. The Government of Newfoundland conferred on the company exclusive rights of landing a cable upon its coast, and privileges were also obtained from the governments of Prince Edward's Island, Canada, and the State of Maine. An unsuccessful attempt to lay a cable across the Gulf of Saint Lawrence was made in 1855, but in the following year this work was accomplished satisfactorily, and one link in the chain completed. The next question was that of the main cable from Newfoundland to Ireland along a route which had previously been surveyed by American and British war vessels, and which, on account of its comparatively shallow depth, was called the Telegraphic Plateau. Extensive tests meanwhile were made to determine the character of the cable, and the many problems involved were discussed with interest by eminent engineers and electricians, many of whom declared the laying and operation of the cable to be impossible.

Through the efforts of Mr. Field, and with the aid of Liverpool and London capitalists, the Atlantic Telegraph Company was formed, with a capital of £350,000, and assistance in the form of subsidies (£14,000 per annum during the operation of the cable was promised by Great Britain); and ships for laying the cable were secured from the governments of Great Britain and the United States. In the first board of directors were William Thomson, who was the electrical engineer of the company, and John Pender; the former, afterwards Lord Kelvin, becoming widely known in the scientific world, while the latter was subsequently interested in the construction and laying of many ocean cables. The conductor, which was prepared under certain specifications, consisted of seven fine copper wires, each of No. 22 gauge, twisted together so as to form a cord which was one-twelfth inch in thickness, and weighed 107 pounds per nautical mile. This was covered with three layers of gutta-percha, over which was a coating of hempen yarn saturated with pitch, tar, beeswax, and boiled linseed oil. The sheathing consisted of 18 strands, each formed by seven No. 22 iron wires, making the entire cable about six-tenths inch in diameter, and its weight one ton to the mile.

This cable, when completed, was divided in two equal portions, and loaded on the U.S.S. *Niagara* and H.M.S. *Agamemnon*, which were loaned for this purpose by the respective governments, and suitably equipped. A start was made from Valentia, a port on the west coast of Ireland, on August 6, 1857, and the cable was paid out from the *Niagara* until a break occurred and the end was lost. At this early stage of cable-laying, such a misfortune served to put an end to the attempt, and the vessels returned to Plymouth, where the cable was stored and protected. Additional capital was raised by the company, 700 miles of new cable constructed, and another attempt was essayed in the following year. Instead of laying the cable directly from the Irish coast, the *Niagara* and *Agamemnon* proceeded to mid-ocean, where they joined the ends of their respective cables and then steamed in opposite directions. Again misfortune attended the expedition, and owing to a double break 144 miles of cable were lost. Notwithstanding these mishaps, another start was made July 17, and on July 29, 1858, the two vessels separated. As a result of good fortune and careful management, they succeeded in landing safely the ends of the cable on the Irish and Newfoundland shores. On August 17 complete connections of the cable with the receiving instruments and land wires were made and the following message was sent over the wire: "Europe and America are united by telegraph. Glory to God in the highest; on earth, peace and good-will toward men." Messages and replies from Queen to President, and between other officials followed, and the event was celebrated enthusiastically on both sides of the Atlantic. The station at Newfoundland was connected with the general telegraphic system of America, and that at Valentia with the British and European lines.

The commercial success of the Atlantic cable was early demonstrated, as an order for the departure of two regiments from Canada was countermanded, saving the British Government about $250,000, while the intelligence received by cable of the collision of the steamers *Europa* and *Arabia* saved the commercial world at least $250,000 that otherwise would have been spent in extra insurance. Owing to the use of currents of too high potential, the cable soon became impaired, and after September 1st it was found impossible to transmit messages; while after October 20 no signals whatsoever passed over the cable. For several years there were no further attempts at laying an Atlantic cable; but Mr. Field was still active in furthering the enterprise and enlisting new capital. During this time a number of cables were laid in Europe and Asia, and improved methods of construction, testing, and operation were being developed. As a result of Mr. Field's efforts, which during these years were unremitting, more capital was subscribed, the company reorganized, and an improved cable, heavier and of greater conductivity, was manufactured. To lay this cable the steamer *Great Eastern* (q.v.), then and for many years the largest vessel afloat, was secured and special cable-tanks and machinery fitted to it. On July 23, 1865, the *Great Eastern* sailed from Valentia and successfully laid over a thousand miles of the cable, which was under test for the entire trip. At this point, however, a break occurred and the cable parted. Various attempts were made to pick up the cable with grappling appliances, which, though demonstrating the possibility of being able to find and raise to the surface a submerged cable, were not attended with success. For another attempt further capital was necessary, and the Atlantic Telegraph Company was practically amalgamated with the newly formed Anglo-American Telegraph Company. Again the *Great Eastern* set forth from Valentia, carrying not only a new cable of improved design, but also a sufficient length to complete the 1865 cable, which was to be discovered and a new length laid from the splice. In both attempts the engineers on the *Great Eastern* were successful, and on July 27, Heart's Content Harbor, Newfoundland, was entered, and the cable was soon landed and connected with the shore. The *Great Eastern* then returned to mid-ocean, and after a series of trials found the broken cable and completed the circuit to Newfoundland. With two working cables, the success of the enterprise was assured, and they were soon in steady use, the rate of transmission of messages improving with new apparatus and the increasing skill of the operators. In 1869 a French cable was laid from Brest to Saint Pierre, and four years later the Direct United States Cable Company was formed, and a cable laid across the Atlantic, landing at Halifax, Nova Scotia, which has since become a favorite landing-spot for trans-Atlantic cables. This company was the first competitor of the Anglo-American Company, which in 1873 and 1874 laid new cables, again employing the *Great Eastern* for this purpose. In 1872 the 1866 cable broke down, and in 1877 the 1865 cable also, so that in 1880 another cable was laid, which was connected to the shore ends of the 1866 cable. In 1879 the Compagnie Française du Télégraphe de Paris à New-York laid a cable across the Atlantic, and in 1881 the American Telegraph and Cable Company, formed by Jay Gould, laid a cable, which was followed by a second in the following year. In 1884 the Commercial Cable Company, or Mackay-Bennett Company, as it was known from the names of its two chief owners, laid two cables, one of which extended direct to New York. In 1894 another cable was laid for the Commercial Cable Company, and also a new one for the Anglo-American Company, giving the latter organization five working lines across the Atlantic Ocean. The longest telegraph cable to cross the Atlantic is that of the Compagnie Française des Cables Télégraphiques, which was laid in 1898, and extends from Brest to Cape Cod, Massachusetts, being 3200 miles in length. It is one of the heaviest cables ever constructed, having 661 pounds of copper and 400 pounds of gutta-percha per nautical mile. In 1900 two cables were laid across the Atlantic, using the Azores as an intermediate station. One of these belonged to the Commercial Cable Company, and extended from Fayal to New York, via Nova Scotia, making the fourth cable operated by this company. At Fayal direct connection is had with Europe by means of the Europe and Azores Telegraph Company's system. In the spring of 1900 the cable of the Deutsch-Atlantische Telegraphen-Gesellschaft was laid from Borkum to Fayal, and in the summer extended to New York, so that on August 31 Emperor William and President McKinley were able to exchange messages. Late in the year 1901, a cable from Fayal, Azores, to Waterville, Ireland, was laid by the Commercial Cable Company and successfully landed at the latter place on November 30, thus giving this company four working cables between Canso and Waterville.

There were, in 1902, 19 cables at the bottom of the Atlantic, of which three were dead, while of the others nearly all could be used duplex. The cost of a modern Atlantic cable is about $2,500,000, and it is interesting to compare this amount with the contract price of the first Atlantic cable, which was £225,000 ($1,100,000). This is due to the greater conductivity, involving, of course, more weight in the core, and also to the increased price of gutta-percha, the supply of which is at least stationary, if not diminishing. It is stated that a submarine cable costs between five and seven times as much as a land line, while the total cost of manufacture and submersion is seven to eight times as much as the construction and erection of the latter. Bright, *Submarine Telegraphs* (London, 1898), is to be recommended for a thorough treatment of the subject, and deals in detail with the history of the various Atlantic cables. Mr. Field's important part in the various cable enterprises is described, largely in the form of letters, in Judson, *Cyrus W. Field: His Life and Work* (New York, 1896). See TELEGRAPHY, SUBMARINE.

ATLAN'TIS (Gk. Ἀτλαντίς, scil. *νῆσος*, *nēsos*, island). A large island, which, according to an ancient tradition, was situated in the Atlantic Ocean, over against the Pillars of Hercules. It is first mentioned by Plato, who, in the *Timæus*, represents an Egyptian priest as describing it to Solon. According to this account, Atlantis was an island larger than Libya and Asia Minor combined. Nine thousand years before the time of Solon it had been a powerful nation, and had been successfully resisted by the Athenians alone. It had finally been engulfed by the sea, which ever after remained unnavigable by reason of the shoal of mud which had been raised on the spot. In the *Critias*, Plato gives a glowing description of the island, and adds thereto its fabulous history. The account of Plato has been considered by some a pure invention of the author's imagination, while others have looked upon it as a real tradition. Various attempts have been made to identify the island. The Canary Islands, the Scandinavian Peninsula, and the American Continent have all been thought to be the land in question. Consult Volquardsen, *Ueber die Mythen bei Plato* (Schleswig, 1871).

ATLAN'TIS. THE ANTEDILUVIAN WORLD. A work by Ignatius Donnelly (1882).

ATLAN'TOSAU'RUS. See TITANOSAURUS.

AT'LAS (Ar., satin, smooth, from *talasa*, to make smooth). The name given to a silk satin manufactured in India and other Eastern countries, and at one time largely imported by European merchants. This material was wrought with threads of gold or silver, was either striped or flowered, and was woven in the most skillful manner, though it lacked the lustre of French silks.

ATLAS (so named from its sustaining the globe of the head, as the giant Atlas sustains the vault of heaven). That piece of the human vertebral column which is nearest to the skull; in other words, the first cervical vertebra. It may be known from the other six by its being without a body or spinous process, by its being a mere irregular bony ring, partly divided into two unequal parts by a constriction; this division in the recent subject is completed by a ligament, the space in front being occupied by the tooth-like process of the second cervical vertebra, and that behind by the spinal marrow. On each side, the ring is very thick; it is smooth and cupped above to receive the condyles of the occipital bone. The corresponding parts below are flat, and rest on the second cervical vertebra.

The atlas, with the occipital bone, forms the joint on which the head moves in nodding, and turns on the pivot of the second cervical vertebra when we look from side to side.

ATLAS. A mountain system of northern Africa, extending in a southwest and northeast direction from the western end of Morocco to the eastern coast of Tunis, in the main parallel with the coast of the Atlantic and the Mediterranean (Map: Africa, D 1). It is generally divided into two parts, the Moroccan and the Algerian Atlas. The former comprises three chains, the Great Atlas in the middle, the

Little Atlas on the coast, and the Anti-Atlas south of the Great Atlas. The Great Atlas contains the highest summits of the entire system, as the Jebel Ayashi (14,600 feet) and Tamjurt (14,500 feet.) The Anti-Atlas is less elevated, and shorter than the main chain. The Little Atlas begins in about longitude 7° W., and finally joins the coast ridge of the Rif. In the Algerian Atlas only two chains are distinguished, separated by an elevated plateau interspersed with numerous saline marshes, called Shotts. The northern chain, Tell Atlas, or Little Atlas, is cut up by coast streams and deep valleys into several separate groups. Its highest summits are more than 7000 feet. The southern range, or Great Atlas, is very wide, and sends off numerous spurs into the Desert. It reaches in its highest peak, Shelia, an altitude of 7611 feet. In Tunis the Atlas system spreads out into a number of separate mountains of inferior altitude. The rocks composing the Atlas system comprise igneous and sedimentary rocks, which belong chiefly to the Archæan and Paleozoic periods. Jurassic, as well as more recent Tertiary formations, are also much in evidence. Copper, iron, salt, and several kinds of beautiful marble, occur in the Atlas. Some of the summits are under snow for the larger part of the year, but even the highest peaks are usually without a snow cover in summer. Consult: P. Schnell, *L'Atlas marocain* (Paris, 1898): T. Fischer, "Ueber meine Reise im marokkanischen Atlas," in *Zeitschrift der Gesellschaft für Erdkunde*, Vol. XXVI. (Berlin, 1899).

ATLAS (Gk. Ἄτλας). According to Hesiod's *Theogony*, one of the Titans, the son of Iapetus and Clymene, and brother of Menœtius, Prometheus, and Epimetheus. Apollodorus, however, says he was a son of Asia, and Hyginus, a son of Æther and Gæa. The Pleiades were daughters of Atlas and Pleione, the Hesperides of Atlas and Hesperis; and countless noble houses in Greek legend traced their origin to the union of a daughter of Atlas with a god. Through all antiquity, Atlas bears the heavens on his shoulders, and this is early declared a punishment for rebellion against Zeus, which story was later elaborated until Atlas became the leader of the Titans in their war against the gods. Atlas, as bearer of the heavens, appears in early Greek art on vases and reliefs in connection with Heracles's search for the apples of the Hesperides. In statuary, Atlas is first represented by the Pergamene school. The plural, Atlantes (q.v.), is applied in architecture to male figures serving as columns. In consequence of the ancient views, which made the vault of heaven rest on solid pillars or other supports, the name Atlas, originally mythological and cosmogonic, was introduced into geography. Mercator, in the Sixteenth Century, gave the name Atlas to a collection of maps, probably because the figure of Atlas supporting the heavens had been given on the title-pages of such works.

ATLAS POW'DER. A high explosive, used for driving tunnels, sinking shafts and wells, submarine blasting, removing wrecks, clearing ice gorges and the like. It consists of nitro-glycerin, in proportions varying according to its use, with small quantities of sodium nitrate and magnesium carbonate, with wood fibre as an absorbent. Like other varieties of dynamite, when not confined it will burn harmlessly; but when fired by a blasting cap it explodes with enormous force. It is put up in cartridges 6 and 8 inches in length and from seven-eighths of an inch to 2 inches in diameter, containing from 20 per cent. to 75 per cent. of nitro-glycerin, according to the special use for which it is desired.

ATMOM'ETER, or EVAPOROMETER (Gk. ἀτμός, *atmos*, vapor + μέτρον, *metron*, measure). An instrument used to measure the amount of evaporation in the open air from a surface of water. It consists of a round dish supplied with an inclined scale to give a magnified reading of the differences in level caused by the evaporation. This loss can also be obtained by weighing the dish and water at the beginning and end of the experiment. In the Piche evaporometer the evaporation is measured by a vertical graduated glass tube closed at the upper end and open below. The tube is filled with water, and the open end is covered with a paper disk held in place by a metal clamp. The water flows down to the paper, from which it evaporates, and the amount of evaporation is measured by taking the difference in readings on the scale. The paper surface gives off about one-third more water in a given time than an equal extent of surface of water in an open dish. The first instrument of this kind was constructed by Sir John Leslie, and employed a porous earthenware ball instead of the paper. When the wind is blowing 5 miles an hour the evaporation is 2.2 times as great as in a calm; at 10 miles, 3.8 times; 15 miles, 4.9 times; 20 miles, 5.7 times; 25 miles, 6.1 times; 30 miles, 6.3 times. Atmometers and other meteorological instruments will be found described in Russell, *Meteorology* (New York, 1899), a popular treatise.

AT'MOSPHERE (Gk. ἀτμός, *atmos*, vapor + σφαῖρα, *sphaira*, sphere, globe). The name applied to the mixture of gases and vapors surrounding any climate or sun, but especially the envelope of our globe. Spectrum analysis tells us much about the constituent gases and vapors, and even the relative motion of these in the atmospheres of the earth, the sun, and the distant stars; we know in general that nearly all of the chemical elements that occur in those are also present either on our earth or in its own atmosphere. The principal constituents of the earth's atmosphere are oxygen and nitrogen, in the ratio of 21 to 79 respectively. The next most important constituent is aqueous vapor, the proportion of which varies from 5 per cent. to nothing, depending upon the temperature and location of the sample of air that is analyzed. The other gases that are most commonly found are carbonic acid gas, whose proportion varies slightly, but may be considered as being on an average 0.04 per cent., and to this extent may be considered as a normal constituent; when this gas is in excess (as in many dwellings where the combustion of fuel or illuminating gas is not properly guarded, or when persons are gathered together without proper provision for ventilation) it is to be considered as an undesirable impurity. Traces of ammonia, hydro-carbons, and possibly ozone, are frequently encountered. The most interesting recent additions to our knowledge have resulted from our ability to cool and condense the air into a liquid form. By the fractional distillation of this liquid air, Rayleigh, Ramsay, Dewar, and others have shown the presence of gases whose densities, calling that of hydrogen 1 and oxygen 16, are as follows: Helium, 1.98; neon, 9.97; argon, 19.96; krypton, 40.88, and xenon, 64. These rare gases are exceedingly volatile, and their presence is held to indicate not that they belong to the earth's atmosphere, but that they are simply diffused through the whole interplanetary space, and are not held down to the earth's surface to any great extent by the attraction of gravitation. On the other hand, a larger body like our sun may have an attractive power sufficient to accumulate a larger proportion of some of these gases in its atmosphere.

The chemical and physical properties of the earth's atmosphere are of vital importance to mankind. In a general way it is ordinarily stated that the stratified portion of the earth's crust, including the fossils, the coal-beds, the oils, the gases, and all hydro-carbon compounds, as well as all the water contained in the rocks, the oceans, and lakes, represents an immense volume of oxygen, nitrogen, hydrogen, carbonic acid gas, etc., that has been abstracted from the primitive atmosphere of the earth, which must therefore have at one time been very much greater than at present. It is supposed that at the present time the formation of new compounds and the disintegration of others on the earth's surface is going on at such a rate as to counterbalance each other, taking the earth as a whole, although there is probably no experimental or observational demonstration of this hypothesis. It is calculated that at the present time any excess of ammonia or carbonic acid gas would be rapidly absorbed by the ocean water, resulting in the formation of precipitates that would accumulate at the bottom of the sea. In general, living plants absorb carbonic acid gas from the air and give up oxygen to it, while animal life absorbs oxygen and gives up carbonic acid gas. It cannot be shown that these two processes exactly counterbalance each other, but of course the tendency is in that direction. An appreciable portion of the atmospheric gases is held in solution by fresh and salt water, where it is utilized by plants and animals that live in the water.

A large part of the aqueous vapor in the atmosphere is retained for months on the earth's surface as solid snow or ice, while other portions, forming as rain or dew, either evaporate quickly or accumulate in lakes and oceans and the superficial strata of soil. But so far as is known, there is at the present time no special tendency toward a steady increase of snow on land or rain-water in lakes and oceans, except possibly over the interior of Greenland and in the central portion of the Antarctic Continent, both of which regions are supposed to be in a permanent glacial condition similar to what must at one time have prevailed over large portions of North America and Europe, and possibly, in their turn, over other portions of the globe. The steady accumulation of a great mass of snow, and especially its periodical accumulations and evaporation, must disturb the earth's axis of rotation, producing periodic changes in latitude, such as are even now going on on a very small scale.

The physical properties of the atmosphere are as important as its chemical. The air becomes thinner as we ascend above sea-level, owing to the fact that it is a compressible gas. The logarithm of the pressure due to the weight of the air above us diminishes in inverse proportion to our altitude above sea-level; this logarithmic law (erroneously called the law of Boyle and Mariotte), which obtains only so long as the air is dense enough to be considered as a gas that obeys the law of Boyle, gives us for the actual density of the atmosphere at an altitude of 50 kilometres, or 31 miles, something less than the 1-7000 part of the density at the earth's surface; that is to say, if there is a pressure of 760 millimeters at sea-level, there will be a pressure of only 0.1 millimeter at 50 kilometers. At some elevation not much greater than this it is necessary to consider each particle of air as a separate satellite, moving rather freely with other particles around the earth in orbits controlled by the general law of gravity, but modified by an occasional impact of one particle on the other. At the earth's surface, these impacts occur with great frequency and control the phenomena or determine the properties of the gas; but at great altitudes the impacts have less importance, and the gas behaves so differently, that it is sometimes spoken of as the ultra-gaseous state, or a fourth condition of matter, or a Crookes's vacuum, since the phenomena peculiar to this condition were first illustrated by Crookes in his vacuum tube. That particles of matter in some form permanently attend the earth at an hundred miles above sea-level, seems to be demonstrated by the behavior of shooting- stars or aerolites, which enter the atmosphere at a velocity of 20 miles per second, and are at once heated up to the burning point by striking the air in front of them; it is only when they descend to the lower atmosphere that they can be said to be heated and burned up by the heat evolved by the compression of the gas immediately in front of them.

The density of the atmosphere at the earth's surface is about the 1-800 part of that of water, varying from the 750th to the 850th with the ordinary variations in pressure and temperature. This slight density offers no appreciable resistance to the ordinary motion of men and quadrupeds, but makes it possible for birds and insects to fly. On the other hand, when the air itself is in motion, the breeze produces a pressure that has been utilized by mankind from the earliest ages to propel sail-boats and ships and drive windmills, so that the atmosphere must be recognized as affording a motive power that has played a most important part in the development of the human race. In fact, the winds set in motion by the solar heat constitute a great 'hot-air' engine. The fact that the atmosphere has weight was first maintained by Galileo and demonstrated by the experiments of Otto von Guericke in his air-pump, and Torricelli with his mercurial barometer, but more especially by Pascal, who, at the request of Descartes, carried his barometer to the summit of Puy-de-Dôme, a mountain in Central France. It is by virtue of this pressure that water ascends the bore of a pump when the piston is raised, allowing the atmosphere to push the water in the well up to the bore as fast as the piston rises. The total mass of the earth's atmosphere has been calculated to be about 1-1,000,000 or 1-1,125,000 of the mass of the earth. (See the *Monthly Weather Review* for January, 1899, page 58.)

As the atmosphere is a fluid, subject at any place to the pressure of all the air above it, it is not only compressed by this weight, but by its elastic reaction it presses outward in all directions with an equal force; consequently, every substance that is immersed in the atmosphere is buoyed up to an extent equal to the weight of the air that it displaces. This buoyancy must be allowed for in all delicate weighings. If the object is a bag or a balloon full of hydrogen, hot air, or other very light gas, the upper pressure or buoyancy may be greater than the weight of the balloon; consequently, the latter rises. (See AERONAUTICS.) This principle gave rise, in the hands of Montgolfier, to the art of aërial navigation, the future of which now depends almost entirely upon our knowledge of the currents of air and our power to steer or guide the balloon.

The air is not a perfect gas, but has an internal friction called viscosity, by reason of which one layer of air sliding past another, experiences a drag, or retard, or resistance. Therefore, any movement of one portion of the atmosphere over or through another portion soon ceases, unless an external force is continuously applied sufficient to overcome the viscosity. This viscous resistance increases with temperature, but is apparently independent of pressure; it is, therefore, greatest in the warmer portions of the globe and less at the poles, and may be zero at the outer boundary of the atmosphere, where the air loses the ordinary characteristics of a gas.

The elastic pressure pervading a mass of quiet air is measured by the barometer (q.v.); but if the air is in motion the barometer must move with the air, or else some device must be used in order to separate the elastic pressure from the pressure produced by the action of the wind on the barometer itself, considered as an obstacle to the wind. This matter will be found fully explained in Abbe, *Meteorological Apparatus and Methods* (Washington, 1887). The observed pressure at any point on the earth's surface is subject to great changes from day to day, which are associated with the movements of the areas of high and low pressure attending fair weather and storms respectively; therefore, the barometer can serve a useful purpose as an indicator of approaching changes of weather. The local pressure also goes through diurnal and annual periodic changes; formerly, these were spoken of as waves of pressure, moving as such over the surface of the globe, but it is not necessary to commit ourselves to such an hypothesis before the true explanation of these variations has been discovered.

Another important physical property is the power of the air to absorb and radiate heat. The specific heat of the air when it is kept at a constant pressure is 0.2379, that of water being unity, and the specific heat, when kept at a constant volume, is 0.1691; the ratio of the two is 1.406. This latter ratio affects the velocity of sound, and, in general, it determines the rate at which air will cool when it is allowed to expand without the addition of heat from extraneous sources. This so-called adiabatic expansion and cooling is the principle that is utilized in cooling the air to the liquid, or even solid state; it is also the principle that controls the cooling of ascending masses of air in the free atmosphere, by which the moisture contained therein condenses into cloud, rain, snow, or hail; this is, therefore, a property of great importance in meteorology.

The absorption of radiant heat by the atmosphere, especially the radiation from the sun and the earth, has been studied minutely, both with the spectroscope and the bolometer. Fraunhofer showed that the dark lines seen in the spectrum of a narrow beam of sunlight proceed mostly from absorption taking place in the sun's atmosphere, but that additional lines and bands seen when the sun is near the horizon must be due to absorption by the earth's atmosphere. The amount of absorption was assumed to be about 25 per cent. when the sun is in the zenith, until Professor Langley showed that it must be at least 40 per cent. of all the energy originally present in the sunbeam. The absorption is greater among the short waves than among the long waves, although there are specific wave-lengths in all parts of the spectrum that are almost wholly absorbed, and others that are very little affected. By virtue of this absorption the air retains a considerable body of heat, which it can only lose by the slow process of radiation; it, therefore, acts as a moderator of our extremes of temperature both by day and by night, both in summer and in winter. Without the atmosphere and especially without its moisture and its carbonic acid gas, we should be subject to much greater vicissitudes of cold and heat than we are at present.

BIBLIOGRAPHY. With reference to the chemical constitution of the atmosphere, general summaries of our knowledge will be found in Schmid, *Lehrbuch der Meteorologie* (Jena, 1861); Hann, *Lehrbuch der Meteorologie* (Leipzig, 1901); Ebermayer, *Die Beschaffenheit der Waldluft* (Munich, 1885); Spring and Roland, *Recherches sur l'acide carbonique de l'air* (Brussels, 1886); Letts and Blake, "On the Carbonic Acid Gas in the Atmosphere," *Memoirs of the Royal Society of Dublin, 1899*. With reference to the absorption and radiation of heat by the atmosphere, see Langley, "Researches on Solar Heat: A Report of the Expedition to Mount Whitney," in *Professional Papers United States Signal Service*, No. 15 (Washington, 1884); Langley, *Annals of the Astro-Physical Observatory*, Vol. I. (Washington, 1901); Very, "Radiation of the Earth's Atmosphere," in *United States Weather Bureau, Bulletin 16* (Washington, 1901).

AT'MOSPHER'IC E'LECTRIC'ITY. Observation shows that the lower atmosphere, with its clouds and rain, or snow and dust, is generally in an electrified state. In November, 1749, Benjamin Franklin argued that lightning is but an immense electric flash, similar to the sparks obtained from electrical machines. On May 10, 1752, Buffon and d'Alibard experimentally confirmed this hypothesis by the use of a lightning-rod near Paris; and in June, Franklin himself, by means of a kite raised during a thunderstorm at Philadelphia, was able to draw electric sparks from the clouds and the atmosphere. Since that day an immense number of observations have been made upon the various electric phenomena of the air. Regular observations of atmospheric electricity were originally made, either by means of kites carrying insulated wire from the ground up toward the clouds, or more conveniently by means of metal rods insulated from the ground by resin, or glass, or silk; the upper end of the rod was sometimes pointed, but more properly ended in a sphere; the lower end was connected with a pair of gold-leaf strips, as in the earliest form of electroscope. This apparatus was improved by attaching a slow-burning match or flame at the upper end of the rod. The best of the early forms of apparatus was that of Dellman, in which a brass ball is electrified by induction and afterwards its exact condition is determined by applying an electrometer. The modern method devised by Sir William Thomson (Lord Kelvin), about 1860, consists of a reservoir of water, supported on insulating glass pedestals; a small insulated tube leads from the reservoir to some point in the open air, at a distance from the building, and the water flowing through this tube forms a stream that is broken into drops within a few inches of the end of the tube. This constitutes the water-dropping collector. In freezing weather the water must be replaced by a vessel of oil, with wick and flame. The most modern apparatus acting by induction is that devised by Mr. Morrill, of the United States Weather Bureau. If the electric potential of the tube and the water at the point where the stream breaks into drops differs from that of the adjacent air, the drops will carry away the positive or negative excess, and soon bring the collector to the same potential as that of the air. The electric condition is observed by measuring, not sparks or currents, but the difference of potential that tends to cause such currents. For brevity, the word 'potential' is used to signify difference of potential. The difference of potential between the air and the earth is measured by connecting the ground and the collector to the opposite poles of some form of electrometer, and for this purpose the quadrant electrometer of Kelvin has been most widely used, since it was first introduced at the Kew Observatory in 1861. A modification of all this apparatus has been used in France since 1875, known as Mascart's system, and this apparatus has also been used by the United States Weather Bureau. In 1884 that bureau inaugurated a systematic investigation of this subject by starting observations and studies under the guidance of Professors Rowland, at Johns Hopkins, and Trowbridge, at Harvard University. This work was subsequently placed under the control of Prof. T. C. Mendenhall, whose report was published in the *Memoirs of the National Academy of Sciences*, Vol. V. (1889). The specific object of this investigation was to determine whether there was any apparent connection between the electrical condition of the atmosphere and the development and progress of storms, so that such observations could be utilized in the improvement of storm and weather predictions, or in drawing lines of equal electric potential on the Daily Weather Map. It was, however, demonstrated that the potential depends so much upon local conditions that observations made in the same neighborhood gave entirely different results, and that it was necessary to learn how to interpret the local record and its oscillations before combining it with records from another station. As it did not seem likely that results of any value in weather forecasting could be secured at present, the further prosecution of the subject was discontinued. The principal work that has been done since 1887 has been that of Elster and Geitel in Germany, Mascart and Chaveau in France, and J. J. Thomson and C. T. R. Wilson in England.

As regards the general phenomena of atmospheric electricity, observations throughout the globe harmonize in showing that, in general, in calm, clear weather a difference of potential exists such that the air is positive and the earth negative; this difference is larger during east and northeast winds in the Northern Hemisphere, and it oscillates violently during thunderstorms; there are also two daily maxima and two minima; the potential difference is much larger in winter than in summer, except during thunderstorms; the difference increases greatly during falling snow and during strong winds. Lord Kelvin suggests that there may be cloudless masses of air having different charges of electricity floating above and producing the observed changes in potential as they pass by the observer.

As regards the origin of atmospheric electricity, a great number of hypotheses have been advanced and discussed; most of the older ones have been shown to be unsatisfactory, but the newest suggestions are still undergoing discussion, and our knowledge of the whole subject remains in an elementary condition. Perhaps the nearest approach to a plausible explanation is found in the work of J. J. Thomson and C. T. R. Wilson, who have been able to show that when aqueous vapor begins to condense from the air it settles by preference on the particles of dust that have a negative electrical charge and that a considerable degree of supersaturation is required to make it condense upon those that are positively electrified. It follows that the first formed particles of fog or cloud are negative and are larger and, therefore, heavier; and that they, settling to the earth as rain, give the ground and the lower portion of the atmosphere a negative charge relative to the upper strata of air. This explanation, is, perhaps, better than another which has had many adherents, namely, that the earth, being negatively electrified, induces a positive charge in the air. The action of ultra violet radiations in discharging a negatively electrified body is the same as though they themselves were positively electrified; and this has led to the hypothesis that the radiation from the sun may give a positive charge to the upper layers of the atmosphere. The hypotheses that atmospheric electricity is due to the evaporation of water at the earth's surface, or to the friction of the wind, or to thermo-electric currents, or to the discharge of great volumes of steam through volcanic vents and geysers, must all be given up as insufficient. If it should be found that we must return to the original theory of Peltier that the earth has a negative charge, and that the atmosphere becomes positive by induction, then the most plausible suggestion—but as yet undemonstrated—is that of Clerk Maxwell, namely, that the tidal strains within the earth's crust and the slipping that cause faults and earthquakes give rise to a development of piezo-electricity that has gradually accumulated until the present condition has been attained. This hypothesis connects terrestrial electricity and terrestrial magnetism together, and may be considered as a new example of the transformation of energy, since it is equivalent to the daily conversion of a small fraction of the force of gravitation into electricity.

For a general summary of our knowledge of atmospheric electricity at the present time, see Hann, *Lehrbuch der Meteorologie* (Leipzig, 1901), pages 711-24. For special memoirs, see Mendenhall, "Report on Atmospheric Electricity," *Memoirs of the National Academy* (Washington, 1889); Exner, *Beiträge zur Erkentniss der atmosphärischen Elektrizität*, a series of memoirs in the successive volumes of the *Sitzungsberichte* of the Vienna Academy of Sciences; J. J. Thomson and C. T. R. Wilson, numerous articles in the *Proceedings* of the Philosophical Society of London; Elster and Geitel, numerous memoirs in the *Sitzungsberichte* of the Vienna Academy of Sciences; Elster, a general report published in *Terrestrial Magnetism* (Baltimore, 1900); and also in the *Memoirs of the International Congress of Physics* (Paris, 1900).

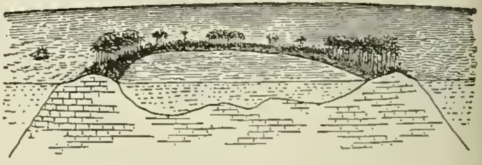
ATMOSPHERIC EN′GINE. See Caloric Engine.

ATMOSPHERIC IN′FLUENCE. Air consists normally of oxygen, nitrogen, water-vapor, and carbonic acid; but owing to the continual decomposition of organic bodies that is taking place in nature, its constituents usually include many other gases, as hydrogen disulphide, sulphur trioxide, etc., which may act chemically on various bodies, and thus gradually cause their destruction. The destructive effects of atmospheric electricity and changes of temperature may also be included among the influences that tend to destroy various materials.

Atmospheric influence is conspicuously shown on buildings and other structures that are exposed to the air. The atmosphere of large towns usually contains an excess of carbon dioxide gas, and, where coal is burned, of sulphur. The resistance of many building materials to atmospheric influence is, however, very great. Granite is regarded as the most stable of building-stones. Egyptian porphyry is also remarkably enduring. Basalt disintegrates unequally according to the amount of feldspar that it contains. The durability of slate is in proportion to its density. Sandstone, millstone grit, and conglomerates are affected through the decomposition of the material cementing their particles, or the mechanical effect of moisture, as by freezing. Limestone decays with varying degrees of rapidity. The application of melted paraffin to structures that tend to disintegrate has been found of value in protecting them from decay. A notable example of atmospheric influence is presented by the Egyptian obelisk in Central Park, New York, which had withstood the ravages of centuries in a dry atmosphere, but is rapidly disintegrating in the moist climate of New York. The power of brick, tile, and the like to resist the influence of the atmosphere is dependent on the chemical composition of the material and the amount of burning in their manufacture. If they contain lime they tend to crack and crumble under moisture. Much care is usually exercised in the proper selection of materials in making cements, and those best adapted to resist atmospheric influence are naturally selected. Wood and timbers are easily influenced and, when moist and exposed to currents, resulting in rapid evaporation, cracks ensue from shrinkage. Dry-rot is the result of exposure to high temperature with consequent imprisonment of natural moisture; while common wet rot is the result of air and water combined. For the protection of wood, ordinary oil paint is the usual preservative. Treatment with special preparations, such as kyanizing, creosoting, and pickling in mineral salts, is also not infrequently resorted to. (See Wood Preserving.) In the case of metals the influence is somewhat complicated by chemical and physical changes. Iron, when exposed to the influence of the atmosphere, absorbs oxygen from the air and becomes rusty or coated with iron oxide. For its protection, as in the case of bridges, a suitable paint is the most satisfactory preservative. Zinc, when exposed, similarly becomes coated with oxide of zinc, which serves to prevent further oxidation. Copper likewise is soon coated with an oxide that serves as a protecting agent. Glass, which is deficient in silica, deteriorates in consequence of the decomposition of its potash and soda. Paintings, statuary, and other works of art, as well as books and manuscripts, readily decay under the influence of the atmosphere. The bindings of books in libraries disintegrate in consequence of the sulphur that is often contained in illuminating gas.

ATMOSPHERIC RAIL′WAY. See Pneumatic Dispatch.

ATOLL, ȧ-tŏl′. The name given by the Malays to a coral reef which forms an annular island, inclosing a lake of water. Some atolls are nearly 100 miles in circumference, and have from 15 to 60 fathoms of water. They make excellent harbors, with safe entrances, always on the windward side. Some of the reefs sustain considerable vegetation, and are inhabited. See Coral Island and Coral Reef.



CROSS-SECTION AND BIRD'S-EYE VIEW OF AN ATOLL.

AT′OM. See Divisibility; Chemistry; Molecules — Molecular Weights; Atomic Weights; Matter.

ATOM, THE HISTORY AND ADVENTURES OF AN. A romance by Smollett (1769), satirizing the English political parties of the day.

ATOM′IC THE′ORY. See Chemistry.

ATOMIC WEIGHTS. If one should weigh out a number of volatile oxygen compounds in such quantities that the volumes occupied by them (under some given pressure and temperature) should be equal to one another as well as to the volume occupied by 2 parts by weight of hydrogen gas, he would find, by analysis, that some of these compounds contain 16 parts of oxygen, others 32 parts of this element, still others 48 parts of it, etc. The number of parts of oxygen in any one of the compounds would be either 16 or some multiple of this number; but in no case less. A similar comparison of the compounds of chlorine would show that they contain either 35.5 parts of this element, or some multiple of 35.5, but in no case less. By extending investigations of this kind to volatile compounds in general, chemists have been able to demonstrate that for every element there is a characteristic number representing the smallest amount of that element capable of existing in a certain fixed quantity of a chemical compound, viz., in a quantity occupying, in the state of vapor, the same volume as 2 parts by weight of hydrogen gas under the same conditions of temperature and pressure. This characteristic number is called the *atomic weight* of the element, and is generally implied in its chemical symbol; thus the symbol Cl stands for 35.5 parts of chlorine, and the symbol O for 16 parts of oxygen. The formula ClO_2, representing an explosive compound of chlorine and oxygen, shows therefore that that compound contains once 35.5 parts of chlorine and twice 16 parts of oxygen; or, briefly, one 'atom' of chlorine and two 'atoms' of oxygen. The great advantage of using atomic weights as units of measurement for the several elements consists mainly in the fact that it permits of representing by integral numbers (usually small ones) the composition of any chemical compound, and that it therefore greatly simplifies inquiry concerning the similarities and dissimilarities in the chemical nature of material substances.

In analyzing equal volumes of compounds, it was seen above that the amounts of the elements found would represent either their atomic weights or multiples of these. Water would yield 2×1 parts of hydrogen and 16 parts of oxygen; hydrochloric acid, 1 part of hydrogen and 35.5 parts of chlorine; caustic soda, 23 parts of the metal sodium (Na), 16 parts of oxygen, and 1 part of hydrogen; common salt, 23 parts of the metal sodium and 35.5 parts of chlorine, etc. If, in studying these compounds, we analyzed, not equal volumes, but equal weights—say, 100 parts by weight of each—we would find their composition in the form of percentages as follows: Water, 11.11 per cent. of hydrogen and 88.89 per cent. of oxygen; hydrochloric acid, 2.74 per cent. of hydrogen and 97.26 per cent. of chlorine; caustic soda, 57.5 per cent. of sodium, 40 per cent. of oxygen, and 2.5 per cent. of hydrogen; common salt, 39.32 per cent. of sodium and 60.68 per cent. of chlorine, etc. Of course, to say that water contains 11.11 per cent. of hydrogen and 88.89 per cent. of oxygen is the same as to say that it contains 2 parts of hydrogen and 16 parts of oxygen. But by comparing the two sets of results just cited it is easy to see that, while the percentage figures have apparently nothing in common with one another, those derived from comparing equal volumes indicate plainly the simple laws according to which the chemical elements are distributed in their compounds.

The reason for choosing the volume occupied by two parts of hydrogen gas as the standard volume for the investigation of compounds is simply this, that by doing so no compound will be found to contain less than 1 part by weight of hydrogen; so that the atomic weight of hydrogen will be 1. If, instead of two, one part of hydrogen gas were chosen as the standard, the atomic weight of hydrogen in its compounds would be found to be one-half, the atomic weight of oxygen would be 8, that of chlorine 17.75, etc. The relative magnitude of the atomic weights would, of course, be the same, but the atomic weight of hydrogen would be one-half. Now, the atomic weight of hydrogen being less than that of any other element, chemists prefer to assign to it the value 1, thus making it the unit with which the atomic weights of the other elements are compared. That by doing so they do not render their results any less general may be readily seen from the fact that the 'two parts by weight of hydrogen gas' taken may be 2 grains, 2 grams, 2 pounds, 2 anything.

But why should equal volumes of compounds form their comparable quantities? A plausible answer to this question is furnished by Avogadro's hypothesis, according to which equal volumes of all gases and vapors contain, under the same conditions of temperature and pressure, equal numbers of molecules. Comparing the composition of equal volumes is consequently tantamount to comparing the composition of single molecules; and that a comparison of molecules should be expected to bring out the laws of chemical composition, is clear. The smallest weights of the elements found in equal volumes of compounds represent, evidently, the relative weights of single atoms of the several elements, and this is why those weights are termed 'atomic weights.' It was the application of Avogadro's hypothesis that first led chemists to compare equal volumes of compounds. The first to demonstrate clearly the advantage of doing so was the French chemist Gerhardt, from whom the modern system of denoting the composition of substances is called Gerhardt's Notation.

The rule directing us to compare equal volumes of compounds in the gaseous state, and thus leading to a knowledge of atomic weights, has been extended also to the state of bodies when dissolved in some solvent. (See MOLECULES—MOLECULAR WEIGHTS.) In case, however, compounds can be neither vaporized without decomposition nor dissolved in any suitable solvent, Avogadro's rule cannot be applied, and then some other principle has to be employed, if in the absence of better material the refractory compound must be used for determining the atomic weight of one of its elements.

ISOMORPHISM. One such principle is based on the general fact that isomorphous compounds, i. e. substances which have about the same crystalline form, usually resemble one another also in their chemical composition. An example may serve to explain how this general fact is made use of for the purpose of determining atomic weights. Suppose the oxide known as alumina were the only compound available for determining the atomic weight of its metal, aluminum. Alumina is neither volatile nor soluble, and hence its molecular weight could not be determined by Avogadro's rule. But it is isomorphous with the oxide of iron, which is known to contain 2 atomic weights of iron to 3 atomic weights of oxygen. Alumina is therefore supposed to have a similar composition, i. e. to be made up of 2 atomic weights of aluminum and 3 atomic weights of oxygen. A chemical analysis would show that alumina contains 53.03 per cent. of aluminum and 46.97 per cent. of oxygen. Calling the atomic weight of aluminum Al, and remembering that the atomic weight of oxygen is 16, we therefore have:

$$2\ \mathrm{Al} : 3 \times 16 :: 53.03 : 46.97.$$

This atomic weight is consequently found to be

$$\mathrm{Al} = \frac{3 \times 16 \times 53.03}{2 \times 46.97} = 27.1—.$$

THE DISCOVERY OF DULONG AND PETIT. Dulong and Petit discovered a remarkable fact, which may be stated as follows: When the atomic weight of a solid element is multiplied by its specific heat (i.e. the amount of heat required to raise the temperature one degree), a number is obtained which is nearly the same whichever element is considered. Thus the atomic weight of iron being about 56, and its specific heat 0.1138, the product is about 6.37; again, the atomic weight of zinc being about 65.2, and its specific heat 0.0956, the product is about 6.24. The two products, while not absolutely the same, are nearly equal. Why the products of such different numbers should be about the same is not yet clearly understood. But the fact can nevertheless be used for practical purposes. The mean value of the products corresponding to the several elements is about 6.3. If, therefore, a new element was discovered, and it would be desirable to ascertain roughly its atomic weight, all a chemist would have to do would be to determine its specific heat and divide 6.3 by that quantity. This method of determining atomic weights is especially useful in cases in which there is doubt as to whether the number assigned to an element is its true atomic weight or a multiple of it. The fact discovered by Dulong and Petit can thus be used at least as a check on the atomic weights determined by other methods.

The Periodic Law. The celebrated Russian chemist, Mendeleyeff, demonstrated a remarkable relation between the physical and chemical properties of the elements and their atomic weights. (For an account of this relation see the article Periodic Law.) Suffice it to say here that the existence of this relation has definitely proved that the atomic weights at present used by chemists are in the truest sense of the term characteristic of the several elements known, and that it is hardly imaginable that future discovery should show them to be worthless and bring about their abolition. Once established, the Periodic Law has been employed as a check on the accepted atomic weights of the elements, but in a sense somewhat different from the law of Dulong and Petit. In several cases (e.g. in the case of platinum), accepted atomic weights were found to disagree with the general relation established by Mendeléeff. The periodic relation thus indicated that those atomic weights must be somewhat incorrect; and, as a matter of fact, careful re-determination showed them to be so and brought to light their true values.

Atomic Weights Referred Either to Hydrogen or to Oxygen. Being purely relative quantities, the atomic weights of the elements assume definite values only if referred to some fixed number chosen to represent one of them. Different sets of atomic weights may therefore be obtained by choosing different standards, and one such set is obtained by assigning to the atomic weight of hydrogen the value 1. This standard seemed at one time preferable to any other, in the light of Prout's hypothesis. According to this the several chemical elements are not really different from one another in substance, but are condensation products of hydrogen. It was consequently expected that careful atomic weight determination would yield whole numbers, if the atomic weight of hydrogen were taken as the unit. Experiment of the highest precision has, however, shown conclusively that the atomic weights cannot be represented by commensurable numbers; so that the common derivation of the elements from one of them is at least extremely improbable, and choosing a 'common unit of measurement' for the atomic weights is as good as entirely useless. Nevertheless, the choice of a standard need not be altogether arbitrary. The actual determination of atomic weights involves analytical processes in which many of the elements are weighed as oxides, the required atomic weights being calculated from the weights of these and from the atomic weight of the oxygen contained in them. Hence, for the sake of simplicity in precise calculations, it is desirable to have the atomic weight of oxygen represented by a whole number. Mainly for this reason chemists have chosen the atomic weight of oxygen itself as a standard, assigning to it the value 16 (the atomic weight of hydrogen is then about 1.01).

Table of Atomic Weights. In the following table the first column gives the numbers recom-

Elements.	Symbols.	Standard, O=16.	Standard, H=1.
Aluminum	Al	27.1	27.5
Antimony	Sb	120.	120.
Argon	A	40.	......
Arsenic	As	75.	75.
Barium	Ba	137.4	137.
Bismuth	Bi	208.5	208.
Boron	B	11.	11.
Bromine	Br	79.96	80.
Cadmium	Cd	112.	112.
Cæsium	Cs	133.	133.
Calcium	Ca	40.	40.
Carbon	C	12.	12.
Cerium	Ce	140.	138.
Chlorine	Cl	35.45	35.5
Chromium	Cr	52.1	52.5
Cobalt	Co	59.	59.
Columbium	Cl	94.	94.
Copper	Cu	63.6	63.
Erbium	Er	166.	169.
Fluorine	F	19.	19.
Gallium	Ga	70.	69.
Germanium	Ge	72.	......
Glucinum	Gl	9.1	......
Gold	Au	197.2	196.7
Helium	He	4.	......
Hydrogen	H	1.01	1.
Indium	In	114.	113.4
Iodine	I	126.85	127.
Iridium	Ir	193.5	193.
Iron	Fe	56.	55.
Lanthanum	La	138.	139.
Lead	Pb	206.9	207.
Lithium	Li	7.03	7.
Magnesium	Mg	24.36	24.
Manganese	Mn	55.0	55.
Mercury	Hg	200.3	200.
Molybdenum	Mo	96.0	96.
Neodymium	Nd	144.	......
Nickel	Ni	58.7	58.8
Nitrogen	N	14.04	14.
Osmium	Os	191.	191.
Oxygen	O	16.00	16.
Palladium	Pd	105.	106.5
Phosphorus	P	31.0	31.
Platinum	Pt	194.8	197.
Potassium	K	39.15	39.
Praseodymium	Pr	140.	......
Rhodium	Rh	103.0	104.
Rubidium	Rb	85.4	85.
Ruthenium	Ru	101.7	104.
Samarium	Sa	150.	......
Scandium	Sc	44.1	......
Selenium	Se	79.1	79.
Silicon	Si	28.4	28.
Silver	Ag	107.93	108.
Sodium	Na	23.05	23.
Strontium	St	87.6	87.5
Sulphur	S	32.05	32.
Tantalum	Ta	183.	182.
Tellurium	Te	127.	127.
Thallium	Tl	204.1	204.
Thorium	Th	232.	231.
Tin	Sn	118.5	118.
Titanium	Ti	48.1	48.
Tungsten	W	184.	184.
Uranium	U	239.5	240.
Vanadium	V	51.2	51.2
Ytterbium	Yb	173.	......
Yttrium	Y	89.	89.
Zinc	Zn	65.4	65.
Zirconium	Zr	90.6	90.

mended by a committee of the German Chemical Society, consisting of Professors Landolt, Ostwald, and Seubert, and now accepted by chemists universally. The basis of these numbers is 16 as the atomic weight of oxygen. The second column gives the atomic weights still much employed in analytical work, the basis being 1 as the atomic weight of hydrogen. Among the names connected with precise determinations of atomic weights, that of Stas is foremost. In recent years Prof. Theodore W. Richards, of Harvard, has carried out a number of determinations of great precision. See also Chemistry; Avogadro's Rule; Molecules — Molecular Weights; Periodic Law.

AT′OMIC′ITY. See Valency.

AT′OMISM (Gk. ἄτομος, *atomos*, uncut, indivisible, from ἀ, *a*, priv. + τέμνειν, *temnein*, to cut). The term used in philosophy to designate the theory that the universe is not an organic whole—i.e. a whole constituted of parts each of which is what it is only in virtue of its essential relation to other parts. Atomism maintains that the universe is an aggregate of elements (atoms), each of which has an intrinsic nature, and that this intrinsic nature would remain unchanged even if there were no universe, but merely this single element existing in absolute solitariness. Atomism is often materialistic (see Materialism); but spiritualistic or psychic atomism has also been stoutly maintained (see Hume), and a dualistic atomism is equally possible, and is the ordinary common-sense view, according to which the material universe is composed of irreducible and essentially independent units, while the world of mind is regarded as composed of self-subsistent souls standing only in accidental relations. These souls may further be regarded as composed of perceptions, emotions, etc., co-existent and successive. This is substantially the view of Locke (q.v.), when stripped of its theistic accessories. For a recent defense of atomism consult James, *The Will to Believe* (New York, London, and Bombay, 1897). For adverse criticism consult Green, *Introduction to Hume*, in Green and Grote's edition of Hume's philosophical works (London, 1874); or in Green, *Works* (London, 1885-86).

AT′OMISTS. See Democritus; Leucippus; Epicurus.

ATONE′MENT (from *atone*, literally to be *at one*). Sin produces estrangement from God and renders man liable to the penalty of the law of God. The work of salvation from this double result is wrought by Jesus Christ, who is sent by God as the Saviour of the world. The word atonement, which originally and literally means 'reconciliation,' is appropriated in theology to designate that portion of the saving work which is wrought by the sufferings and death of Christ. He lays thereby the objective ground of forgiveness, which we could not lay for ourselves, and without which our salvation could not be effected. There were, therefore, some obstacles to forgiveness existing apart from the spiritual condition of the sinner himself. What these were, and how the death of Christ serves to remove them, it is the object of the doctrine of the atonement to explain.

So fundamental is the doctrine of the atonement in the Christian religion that it does not, like many other doctrines, form a ground of distinction among the different bodies into which the Christian world has been divided. All churches may be said to be equally orthodox on this point. The Church of Rome, the Greek Church, the various Protestant churches—established and dissenting—all agree, taking their standards as a criterion, in resting the sinner's hope of salvation on the mediatorial work or atonement of Jesus Christ. Nevertheless, there have been from the very beginning of speculative Christian theology, and still continue to be, within the bosom of the several churches, various ways of conceiving and explaining the exact nature and mode of operation of this mediatorial work. What follows is a brief sketch of the historical development of these speculations.

Christianity differs from heathenism in the clear perception which it has of the antagonism that sin has caused between God and man. Heathenism but vaguely conceives of this variance, and consequently has but an ill-defined notion of the atonement required, the notion seldom containing more than the idea of a reconciled union of the individual man with nature and the universal life. Even where its mythical divinities assume personality, it is but an ideal personality without any concrete reality of life, and consequently without any real significance for the conscience. In this state, the abject subjection of man to nature prevents his rising into that sphere of conscious freedom which makes sin sinful, and demands an atonement with one who is Lord both of nature and of man.

In Judaism, man stands above nature, in conscious relation to a personal God, whose written law exhibits the requirements of His relationship with man—requirements which are never met, and which only make him fearfully conscious of the ever-widening breach between him and his God. Thus the law awakened the sense of guilt and the desire for an atonement—a desire it could never satisfy. The never-ceasing demands of these ever-unfulfilled requirements were constantly acknowledged by its whole sacrificial *cultus*, which expressed the hidden ground of Jewish hope and prophetically pointed to its future manifestation.

The Old Testament Scriptures, as commonly understood, present a gradually enlarging revelation of the idea of a suffering and vicarious Messiah, culminating in the prophecy of Isaiah (chap. liii.). Of this the whole sacrificial system was typical and prophetic (Lev. xvi. 21; xvii. 11; compare Heb. x. 1-18). Modern study of the Old Testament, under the influence of the idea of development, has sometimes emphasized the human element of the sacrificial system, and denied its divine origin and permanent significance. But more sober employment of the canons of criticism finds the course of biblical development in favor both of the divine element from the beginning and of its true culmination in the work of Christ.

In the New Testament, Christ is everywhere exhibited as one sent from God for the salvation of the world (John iii. 16, 17); and as the condition on the part of man of his obtaining this salvation, we read of the requirement of repentance, faith, and reformation (Matt. iv. 17; v. 3, 11; vi. 12; Mark xvi. 16; Luke xv. 11);

while on the part of God, as conditioning and mediating His forgiveness of sins, we have exhibited the entire life of Christ upon earth, conceived of as embracing severally its individual features (Acts v. 31; Rom. iv. 25; viii. 34); but more especially His death as a ransom for our sins (Matt. xx. 28; xxvi. 28), as a vicarious sacrifice (I. Pet. i. 19; II. Cor. v. 21), by which we are redeemed from the bondage of sin (I. Tim. ii. 6; Gal. iii. 13; II. Pet. i. 3), and obtain forgiveness (Rom. v. 19; I. Cor. xv. 3; I. John i. 7) and eternal life and peace with God (John x. 11; Col. i. 20). Christ is therefore the mediator between God and man (I. Tim. ii. 5), having made peace through the blood of His cross (Col. i. 20); the propitiation for our sins (I. John ii. 2; iv. 10); and our high-priest who offers Himself a sacrifice to reconcile us with God (Heb. ii. 17; v. 1; ix. 28).

In accordance with this full and explicit teaching of the Scriptures we find that the sufferings and death of Christ were ever regarded as of primary and essential importance in His work of redemption. The earliest fathers do not carry us much beyond the very words of Scripture. The doctrine is taught by them without inquiry into its speculative implications. The occasion for a systematic treatment of the doctrine had not yet arisen. "On this head there has been a twofold mistake—sometimes the existing beginnings of many later elaborated dogmas have been overlooked; or, on the other hand, it has been attempted to point out with literal distinctness Church doctrines as if already developed." The early Church Fathers dwell with a sort of inspired devotion upon those facts of the Gospel which represent Christ as the sacrifice for our sins, as the ransom paid for our redemption, as our deliverer from the power of Satan, as the restorer to mankind of whatever was lost by the fall of Adam; but they were not concerned with the speculative aspects of the doctrine and naturally did not attempt to explicate them. An elaborated system of theology is not to be looked for at this early stage of the Church's existence.

The narrow limits of this article will not allow us to specify the many ways in which the sufferings and death of Christ were regarded in relation to the atonement for sin. During the first four centuries there appeared no certainty of opinion as to whether they were a ransom-price paid to God or to the devil. The latter supposition is the more prevalent, and is shared in by Origen and Saint Augustine. Gregory of Nyssa (died 394) explains this opinion by saying that the devil consented to receive Jesus as a ransom, because he regarded Him as more than an equivalent for all those under his power; but that, notwithstanding his subtlety, he was outwitted, for, owing to the humiliation in which Christ was veiled, he did not fully recognize Him as the Son of God, and consequently was himself deceived. But having consented to receive Him as a ransom for mankind, he was righteously deprived of his dominion over man, while he could not retain Jesus when he discovered Him to be the Holy One of God, being horrified and tormented by His holiness.

Athanasius (died 373) with characteristic vigor controverted this notion, and maintained that the ransom was paid to God. He argued that as God had threatened to punish transgressors with death, He could but execute His threat. But then it was not becoming the character of God to allow His purpose in the creation of man to be frustrated by an imposition practiced upon Him by the devil. The only expedient, therefore, which remained for his deliverance from death was the incarnation and sacrifice of the Logos in his stead, by which the justice and veracity of God would be maintained, man delivered, the law fulfilled, and the power of the devil broken. Gregory Nazianzen, although he accounts for the deception of the devil much as Gregory of Nyssa had done, yet in another place distinctly repudiates the supposition that Christ paid the devil. Saint John of Damascus sums up all results of theological speculation in the East, and he utterly sets aside Origen's notion.

Saint Anselm's famous treatise (*Cur Deus Homo*) marks a new epoch in the treatment of the doctrine, and the discussion of it within the Church has continued ever since within the lines which he has laid down. The Piedmontese Archbishop of Canterbury lived before Bernard and Peter Lombard, who, however, did not follow him, because the new position which he occupied did not become immediately the accepted one. His view did, however, prevail in substance, and became dominant in the Scholastic period, supplanting Origen's entirely. The following is, in all essential respects, his statement of the doctrine: The creature owes to God, as the Great Sovereign, perfect obedience. When he refuses this, he substantially denies the sovereignty of God and impairs the divine honor. His sin cannot be overlooked without making God the God of injustice and disorder. Hence there must be a satisfaction that shall repair the wrong done. The punishment of man would effect this; but it would also destroy man. If another could be found who should be able, by the infinity of his nature, to satisfy for infinite guilt, and by being himself man to take the place of man, such a one might satisfy for him. The God-man fulfills these conditions. By His death, as an act to which He was not Himself bound, He satisfies for man, and receives as a reward the forgiveness of those whom He wills to save. Anselm's view did not find its way into immediate favor. Origen's opinion had struck deep root in the Western Church; Saint Augustine had adopted it, and was followed by Saint Leo. Although coming after Anselm, Bernard and Peter Lombard, the Master of the Sentences, accepted the tenet of Origen. But by the time of the later Schoolmen Anselm's view was generally received.

Subsequent to the time of Anselm, and prior to the Reformation, there are two views of the atonement which divide the opinions of this period—the one regarding the peculiar manner in which it was accomplished as absolutely necessary, and deriving its efficiency from its objective nature; the other supposing a subjective connection between the sufferings of Jesus and the price of redemption, because this was best fitted to effect the moral transformation of men. According to Anselm, the satisfaction rendered by Christ was greater than the guilt for which He atoned; and it needed to be greater; for the payment of the debt due to God gave men no claim to the favor of God.

Thomas Aquinas (died 1274) and his followers maintained Anselm's opinion of the infinite value of the blood of Christ, rendering it more than sufficient; while the Scotists maintained that it was sufficient only because God was pleased to regard it as sufficient. Here the controversy rests among Catholics. The prevailing view among Catholic theologians is that of Saint Thomas's development of Saint Anselm's position.

We now come to the period of the Reformation, when the doctrine of the atonement began to be speculatively viewed from the standpoints of the various reformers (the foremost of whom was Luther) and their followers. In the writings of Luther, one will only with difficulty arrive at his intellectual apprehension of this doctrine in its scientific form; but setting out with the consciousness of sin, one will everywhere discover how he realized that in Christ all sin is 'vanquished, killed, and buried, and righteousness remaineth a conqueror and reigneth forever.' The following is an outline of the Lutheran doctrine, as laid down in the *Concordienformel:* It is alone by faith that we can receive the blessings given to us in the Gospel by the Holy Ghost. Faith justifies, because it appropriates the merit of Christ. Therefore, the righteousness which is imputed to the believer, simply by the grace of God, is the obedience, the suffering, and the resurrection of Christ, by which He has satisfied the claims of the law and atoned for our sins. For as Christ is not merely man, but God and man in one person, He was, as Lord of the law, no more subject to it than He was subject to suffering and death. For this reason His twofold obedience—that which he rendered, on the one hand, by His suffering and death; and, on the other, by His righteous fulfillment of the law on our behalf—is imputed to us, and God acquits us of our sins, and regards us as just, in view of His complete obedience in what He did and suffered. This obedience embraces the entire existence of Christ upon earth, and is so complete that it fully covers the disobedience of men, so that it is not reckoned against them for condemnation. Christ is our righteousness, therefore, only in so far as in His entire person the most perfect obedience is exhibited, which He was able to render, in that He was neither God alone nor man alone, but both in one, God and man.

According to Calvin (*Institutes,* 1559), if one asks how Christ has reconciled us with God, and purchased a righteousness which made Him favorable to us, it may be answered, generally, that He accomplished this by the whole course of His obedience. But although the life of Christ is to be regarded as paying the price necessary for our deliverance, the Scriptures ascribe our redemption especially to His death. Calvin attached great importance to the particular mode of His death—any other mode of death would not have rendered the same satisfaction to God. He, however, says little or nothing about Christ's fulfilling the law for us, but dwells upon His delivering us from its curse. He does not, therefore, exhibit His active obedience separated, as an essential part of His satisfaction for sin, from His passive obedience. The importance attached to the obedience of His life arises from its natural and necessary connection with His suffering and death. And the great importance attached to His death is drawn rather from the view of its subjective necessity than from the idea of the divine righteousness—namely, that without such a death there would have been no sufficient ground for the subjective realization of deliverance from sin and guilt. Calvin's view differs from that of the Lutheran *Concordienformel* in that he does not regard the relationship of God to man merely from the standpoint of punitive and satisfying righteousness, which always leads to the merely negative notion of a redeemer from guilt and punishment; but looks upon Christ as the highest mediator, through whom the nature of God is communicated to man. There was a necessity for Christ's incarnation, not merely because, apart from the suffering of the God-man, the divine righteousness could not be atoned, but also because without such a divine mediator there could be no vital relation between God and man. "Had man remained free from all taint, he was of too humble a condition to penetrate to God without a mediator."

Socinus (*De J. C. Servatore,* 1577) endeavored to prove the falseness of this theory. He shares with the Protestants the subjective principle, which the period of the Reformation established, but developed it in a one-sided manner. Socinianism represents man as attaining to oneness with himself and with God by his own moral energy. It rejects that idea of the righteousness of God which makes it impossible for Him to forgive sin without satisfaction, as imposing finite limitations upon the Divine Being; and also objects to the doctrine of satisfaction, on the ground that satisfaction for sin and forgiveness of sin are incompatible with each other; and, moreover, objects that sin and punishment are of so personal a nature as not to allow of their being transferred. It further opposes the doctrine of the active and passive obedience of Christ, on the ground that the one excluded the other. Another objection maintained the actual impossibility of Christ's rendering the supposed satisfaction for sin.

The doctrine it sought to establish in the place of the one it attempted to overthrow may, in brief, be stated as follows: Man is reconciled to God by repentance and reformation. Only from an act of man changing his disposition, and not from an act of God changing His relation to man, follows his reconciliation with God. God is, in Himself, ever the same toward man—reconciled for all eternity; man alone has to assume a new relation. As soon as he does this, he is immediately reconciled; by this act of his will he is at one with God. Only in man's moral state is there any obstacle to his reconciliation. This greatest and holiest accomplishment—the reconciliation of man with God—is achieved by an act of his will.

In this purely subjective theory, repentance occupies the place of faith in the orthodox doctrine, and faith becomes identical with obedience; for repentance and reformation are regarded as but the two sides of the same act of the will. It follows from this that justification is of works as well as reconciliation. A necessity for the sufferings of Christ is shown for the following objects: That he might become our example; better fitted to render us help; that we might have a pledge and guarantee of the divine forgiveness; and as conditioning His resurrection and ascension to glory.

Grotius (*Defense*, 1617) set out to defend the orthodox position by first securing a new point of departure. Both the Calvinists and Socinus had viewed God in the matter of sin and penalty as the offended party. Employing the analogies of human law, Grotius said God is not the offended party, but the Divine Ruler (rectoral theory); and the sufferings of Christ do not satisfy justice, but are a penal example designed to deter men from sin, thus rendering it consistent with the interests of the divine government to forgive the penitent.

Socinianism has undergone much change, especially of spirit, in modern Unitarianism. One of its best English advocates, the Rev. Prof. John James Tayler (died 1869), presents the doctrine thus:

"'There is *one* mediator between God and men—the man Christ Jesus.' This can only refer to unrivaled preëminence, not to exclusive function. For all higher minds do, in fact, mediate between their less gifted fellow-creatures and the great realities of the invisible world. This '*one*' is a *human* mediator, 'the man Christ Jesus'—not a being from another sphere, an angel or a God, but a brother from the bosom of our own human family. 'He gave Himself a ransom for *all*' who embrace his offers and will harken to His voice. He brings from God a general summons to repent; and with that He conveys, through faith, a spiritual power to shake off the bondage of sin, and put on the freedom of a new heart and a new life. He is a deliverer from the power of sin and the fear of death. This is the *end* of His mediation; this is the redemption of which He paid the price. His death, cheerfully met in the inevitable sequence of faithful duty, was only one among many links in the chain of instrumentalities by which that deliverance was effected. It was a proof, such as could be given in no other way, of trust in God and immortality, of fidelity to duty, and of love for mankind. In those who earnestly contemplated it, and saw all that it implied, it awoke a tender response of gratitude and confidence, which softened the obdurate heart and opened it to serious impressions and the quickening influences of a religious spirit."

The American leader of Unitarianism, Channing (died 1842), was less clear in affirming the simple humanity of Jesus; but with reference to the atonement, he founds our salvation upon the 'boundless and almighty goodness of our Father,' and describes the work of Christ as consisting in His teaching and example. The death of Christ he seems to regard simply as an impressive element of His instruction. More modern Unitarians generally regard it as the death of a martyr, incidental to His mission as the greatest of religious leaders.

A distinct period in the history of Calvinism in regard to this doctrine was introduced by the influence which Grotius gained in America in the last quarter of the Eighteenth Century. Under the pressure of the Universalist controversy, a number of New England leaders adopted the idea that the position occupied by God in the matter of penalty is that of ruler, and that the sufferings of Christ are a penal example. The justice that was satisfied was the 'general' justice of God, which was identified with love. Hence, sinners cannot claim forgiveness in 'justice' (as tho Universalists had said, founding thereupon their doctrine that all men may claim it, since Christ died for all), for the sufferings of Christ only make it *consistent* with the general interests of God's government to forgive the penitent, yet not obligatory upon God. Atonement is general, that is 'sufficient' for all, though 'efficient' only for the elect. There is no imputation, whether of our sins to Christ or of His merits to us. Propitiation does not placate God, as if He were enraged against men, whom, on the contrary, He loves, sending His Son for them. But it removes obstacles lying in His government and preventing forgiveness without atonement, and thus inclines Him to forgive. The analogies of government were more emphasized than the ethical root of the theory, and it therefore assumed a somewhat mechanical form; but it was the beginning of a new emphasis upon the ethical element. It spread widely in America, and got a considerable following also in Great Britain.

The most recent period of discussion of this doctrine has been marked by the effort to rid it of 'artificial' elements in favor of the ethical. Among the protagonists of this period must be mentioned John M'Leod Campbell (*Nature of the Atonement*, Cambridge, 1856). His views are as follows: The work of the Son of God, who came to do and did the will of His Father, must, in view of the deliverance which He wrought, be regarded as twofold—first, as dealing with man on behalf of God, and, second, as dealing with God on behalf of man.

In dealing with man on behalf of God, Christ revealed to us the Father in His relation to a sinful world; showed us what our sins were to God; vindicated in the world the Father's name, and witnessed to the excellency of that will against which we were rebelling. In thus revealing the will of the Father toward sinful men, He necessarily became a man of sorrow and suffering; but these arose naturally out of what He was, and the relation in which He stood to those for whom He suffered; and to the holiness and love of His very nature must we refer their awful intensity and immeasurable amount. He suffered what He suffered just through seeing sin and sinners with God's eyes, and feeling in reference to them with God's heart. By what He suffered He condemned sin, and revealed the wrath of God against it. His holiness and love, taking the form of suffering, compose the very essence and adequacy of His sacrifice for sin.

Again, in dealing with God on behalf of man, the oneness of mind with the Father, which toward man took the form of condemnation of sin, became in His dealing with the Father in relation to us, a perfect confession of our sins, which was a perfect Amen in humanity to the judgment of God on the sin of man. Such an Amen was due in the truth of all things; due on our behalf, though we could not render it; due from Him as in our nature and our true brother. He who was the truth, could not be in humanity and not utter it; and it was necessarily a first step in dealing with the Father on our behalf. This confession of our sins by Him who, as the Son of God and the son of man in one person, could perfectly realize the evil of man's alienation, was a peculiar development of the holy sorrow in which He bore the burden of our sins; and which, like His sufferings in confessing His Father before men, had a severity and intensity of its own. But apart from the sufferings present in that confession, this Amen from the depths of the humanity of Christ to the divine condemnation of sin is necessarily conditioned by the reception of the full apprehension and realization of the wrath of God, as well as of the sin against which it comes forth into His soul and spirit, into the bosom of the divine humanity; and, so receiving it, He responds to it with a perfect response, and in that perfect response He absorbs it. For that response has all the elements of a perfect repentance in humanity for all the sin of man—a perfect sorrow—a perfect contrition—all the elements of such a repentance, and that in absolute perfection; all—excepting the personal consciousness of sin; and by that perfect response or Amen to the mind of God in relation to sin is the wrath of God rightly met, and that is awarded to divine justice which is its due, and could alone satisfy it.

This confession of the world's sin by the head and representative of humanity was followed up by His intercession as a part of the full response of the mind of the Son to the mind of the Father—a part of that utterance in humanity which propitiated the divine mercy by the righteous way in which it laid hold of the hope for man which was in God. "He bore the sins of many, and made intercession for the transgressors."

But the most influential effort to put the doctrine upon a purely ethical basis was that made by Horace Bushnell. His final theory was presented in two works, *Vicarious Sacrifice* (New York, 1865) and *Forgiveness and Law* (New York, 1874). The theory is founded upon the almost complete identification of man's moral nature with God's. Christ was under obligation to Himself to do all that He did, and neither in this respect nor in regard to the definite things which He did was He in a situation essentially different from that which we should have occupied. His great work in coming into the world is to bring men back to God by producing a moral revolution in their souls. He effects this by exercising upon them His moral power, gained by what He showed Himself to be. But He cannot thus save them without entering sympathetically into their lot, and having 'His heart burdened with a sense' of it. This was His vicarious (sympathetic) sacrifice. It involved death, because He could not engage in this work without incurring the rancorous and murderous enmity of sinful men. The death of Christ was also necessary upon God's account. As we cannot forgive unless we have so suffered for the sinner as to lose our 'disgusts' at his sin by the energy of our loving effort to make him better and convert him into a friend, so with God. The suffering of the death of Christ enables God to put away all His disgusts, and thus really propitiates Him. It is His self-propitiation. This theory seems to be gaining greatly in influence. One of the best recent statements of it is by W. N. Clarke, *Outline of Christian Theology* (New York, 1897).

In Germany, the most important recent work upon the atonement has been that of Ritschl (*Justification and Atonement*, 1874, Eng. trans., Edinburgh, 1900), in which it is maintained that the fundamental element of the Gospel is that God is already propitious to men. Hence, the death of Christ does not perform any work of propitiation. It is rather a 'covenant offering,' a declaration upon Christ's part that He would at any price—even that of death—maintain the covenant and obey God perfectly, and a pledge given by Him in behalf of His followers that they would do the same. The course of subsequent work in this department has been to lay renewed emphasis upon the ethical element in Christ's work, and to revert to the old theories ethically interpreted. Kaftan renews the emphasis upon the idea of punishment (*Dogmatik*, 1897), and maintains that, for reasons lying in our whole educational development, God must, in connection with the act of forgiveness, so manifest his moral earnestness in reference to sin as to make upon us the right moral impression. Christ does not bear 'the penalty for sin which was due to man,' but He bore 'what entered the world as consequence and punishment for our sin,' and this, 'because it was the means of the revelation of the divine love, freed us from punishment and conferred upon us salvation.'

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ATONEMENT, or EXPIATION, DAY OF. A Jewish fast day, occurring on the tenth day of the seventh month (Tishri), and observed as a day of humiliation and supplication. The laws in connection with it are found in Lev. xvi., and in some scattered passages (Ex. xxx. 10; Num. xxix. 7-11), all connected with the Priestly Code. (See PENTATEUCH.) It was a day devoted to worship, on which all manner of work was forbidden; abstention from food, from drink, and pleasure commanded; and so long as the Temple stood, during the post-exilic period, a long sacrificial service was gone through. The centre of the service was the high-priest, who had, according to the Talmudical tradition, to spend the seven preceding days in separation from all persons and in careful study of the duty imposed upon him. On the Day of Atonement, dressed in white linen garments (not in the gorgeous dress of his office), he entered the holy of holies and confessed his sins. He then chose two goats, and by lot determined which one was to be sacrificed. This one was killed, and its blood sprinkled in front of the veil in the holy of holies. The second one, after the high-priest had rested his hands on its head and had confessed the sins of the whole people, was given in charge of trusty men, who led it outside of the city limits, and then one of them released it in the wilderness (Lev. xvi. 10-21). While the biblical ritual for the day contains some evidently ancient features, and while the sanctity of the tenth day of the 'sacred' seventh month probably reverts to an early epoch, the institution of the distinctively Jewish Day of Atonement is an outcome of religious conditions as they existed during the Babylonian exile. The earliest trace of the biblical ceremonial is to be found in Ezek. xlv., though his prescriptions for the day are much simpler than those found in Leviticus. With the destruction of the Temple and the abolition of sacrifice, the Day of Atonement was changed in one important particular—from being a purely national fast, it has now also an individual side. At present the day is kept by fasting from sunset of the ninth to sunset of the tenth day of Tishri, and by services in the evening and all day. An important part of the service is the recital of the service of the Temple, as handed down by tradition.

Just as the popular sense of guilt experienced during the Babylonian exile furnished the conditions favorable for the institution of a great atonement day, so the second destruction of Jerusalem directly contributed not only toward enhancing the importance of the day, but toward giving to it a sombre character relieved only by the consolatory hope of securing, by a strict obedience to elaborate ceremonial regulations, forgiveness of individual sin and the assuagement of divine anger manifested by the loss of national independence. An entire treatise of the Talmud, known as *Yoma* (i.e. The Day par excellence), is devoted to setting forth the ceremonies and ritual for the fast, and to this day, despite general laxity prevailing in wide circles, Jews of the most advanced views still observe the day as the most sacred of the year.

Bibliography. On the biblical observances and questions connected with its origin consult: W. Nowack, *Hebräische Archäologie*, Vol. II. (Freiburg, 1894); I. Benzinger, *Hebräische Archäologie* (ib. 1894); J. J. Wellhausen, *Prolegomena zur Geschichte Israels* (Berlin, 1899); for the later observances: J. Lightfoot, *The Temple Service*, Vol. II. of his Collected Works (London, 1864); A. Edersheim, *The Temple, its Ministry and Services* (ib. 1894); L. Dembitz, *Jewish Services in Synagogue and Home* (Philadelphia, 1898).

ATOS′SA (Gk. Ἄτοσσα). The daughter of Cyrus, and the wife successively of Cambyses, Smerdis, and Darius Hystaspis. She is mentioned by Herodotus, and according to one account was killed by Xerxes. The name corresponds merely in form to that of Vīshtāspa's wife, Hutaosa, in the Avesta (q.v.). See Zoroaster.

ATRATO, ȧ-trä′tō. A river of Colombia, South America, rising at an altitude of over 10,000 feet, in latitude 5° 20′ north (Map: Colombia, B 2). It flows in a northern direction, and enters the Gulf of Darien by 16 arms, only a few of which are navigable. The river is about 400 miles long, and navigable for more than 200 miles. The Atrato was considered in connection with the canal between the Atlantic and the Pacific, and expeditions were sent out by the United States Government to explore its course in 1857 and 1870; but the reports in both cases were unfavorable, and the project was abandoned.

ATREBATES, ȧ-trĕb′ȧ-tēz *or* ăt′rē-bā′tēz, or Atrebatii, ăt′rē-bā′shĭ-ī (Lat.). A people of Belgic Gaul, whose name survives in the name of the old Province of Artois. In a confederation against Julius Cæsar they furnished 15,000 troops. There was once a colony of them in Britain, in Berkshire and Wiltshire.

ATREK, ȧ-trĕk′. A river of Persia (Map: Persia, F 2). It rises in the northeastern part of the country, near Kuh Rizeh mountain (9700 feet), and, flowing in a western direction, forms the boundary line between the Russian Trans-Caspian territory and Persia. It falls into the Caspian Sea, at Hassan Kuli Bay, after a course of over 300 miles.

ATREUS, ā′trōōs (Gk. Ἀτρεύς). In Greek legend, son of Pelops and Hippodamia, grandson of Tantalus, and brother of Thyestes. In the Iliad there is no trace of the terrible feud between the brothers. This legend develops later, perhaps under the influence of Dorian hostility to the Achæan rulers of the Peloponnesus, and is told in many forms. The main features are as follows: Atreus married Cleola, by whom he was the father of Pleisthenes; his next wife was Aërope, by whom he had Agamemnon and Menelaus; his last wife was Pelopia, daughter of his brother Thyestes. The main story of Atreus begins in blood, he and Thyestes being induced by their mother to kill their step-brother Chrysippus, the son of Pelops and the nymph Axioche. After the murder, the perpetrators fled to Mycenæ, where the king, Eurystheus, was their nephew. He lost his life in war with the Heraclidæ, and Atreus succeeded him as King of Mycenæ. Thyestes seduced Atreus's wife Aërope, and stole the golden lamb which was the gift of Hermes. Atreus expelled Thyestes, who sent Atreus's own son Pleisthenes to kill him; but the father slew the son without recognizing him. Then Atreus prepared a great revenge. Professing to be reconciled to Thyestes, he invited him to Mycenæ, killed the sons of Thyestes, and served them as a banquet for their father. In the midst of the meal, Atreus showed the heads and hands to Thyestes, who, struck with horror, cursed the house of Atreus and fled, while the sun turned its face from the scene. Thyestes, once more driven out by Atreus, came to Sicyon, where he found his daughter Pelopia, whom he violated without recognizing her. She was then married to Atreus, who was also ignorant of her parentage. Her child by Thyestes was exposed, but rescued and brought up by Atreus, who named him Ægisthus. Later Atreus sent Agamemnon and Menelaus in search of Thyestes, whom they brought back to Mycenæ; whereupon Atreus imprisoned him and sent Ægisthus to kill him. Ægisthus having been recognized by his real father, Pelopia recognized the dreadful truth and killed herself, while Ægisthus slew Atreus, who was offering sacrifice on the seashore. In later times the great domed tombs at Mycenæ were pointed out as the treasuries of Atreus and his sons; and the largest is still popularly called the 'Treasury of Atreus.'

ATREUS, TREASURY OF. A famous subterranean structure at Mycenæ, so called on the authority of Pausanias. It is also popularly called the 'Tomb of Agamemnon.' It is the largest of the vaulted tombs called 'bee-hive' tombs from the method of vaulting in which the arch is formed by projecting horizontal layers of stones narrowing to the top. The building consists of a circular chamber, 50 feet wide and high, connected with a small square room, both covered by the material removed in the process of building. It is approached by an entrance passage of masonry 115 feet long, leading to a deep doorway richly ornamented.

ATRI, ä'trê (anciently, *Hadria*). An episcopal city in the Province of Teramo, Italy, 8 miles from the Adriatic and from Mutignano, which is on the Bologna-Brindisi Railway, 79 miles south of Ancona. The cathedral has interesting frescoes, and a Fifteenth-Century painting of the Madonna adoring the Child. The Campanile is over 200 feet high. There are a few ruins of ancient walls and buildings, and south of the city are grottoes probably once used as prisons. The manufactures are silk, soap, and licorice. Population (commune), in 1881, 10,642; in 1901, 13,448.

AT'RIPLEX (Lat., from Gk. ἀτράφαξυς, *atraphaxys*, the orach). The name of a genus of plants of the order Chenopodiaceæ. The species are numerous, and are found in nearly all tropical and temperate climates. Many of them are weeds, but a number have come into notice as valuable forage plants for the hot alkali regions of Australia and California. For this purpose *Atriplex semibaccata* and *Atriplex leptocarpa* are among the most promising. They are commonly known as saltbushes, because they grow in saline regions, where no other valuable plant will survive.

A'TRIUM (Lat., a hall; literally, 'dark-room,' from *ater*, black, dark, referring to the smoke from the stove or hearthstone. See below). In Roman architecture, the one large apartment of the primitive Italic and Roman house; the general room which served for kitchen, dining-room, reception and sleeping room. In it was the hearthstone, and the nuptial couch remained there as a symbol, even after the addition of bedrooms around it. As the Roman house became more sumptuous, small rooms were multiplied around this central hall, which remained immediately opposite the entrance, and then took the name also of *cavædium*. There were different kinds of atria: (1) The earliest kind, with the solid roof (*atrium testudinatum*); (2) next, the Tuscan atrium (*tuscanicum*), which became the national type before the close of the Republic, with a square opening (*compluvium*) in the centre for admitting light. The roof sloped inward, so that rain-water flowed into a basin (*impluvium*) beneath the opening. With the enlargement of house and atrium came (3) the tetrastyle atrium (*tetrastylum*), with four columns supporting the central opening; and finally, with the further sumptuousness of the times of Cicero and Augustus, came (4) the Corinthian atrium, where the four columns are multiplied into a real colonnade; and in this form the atrium is indistinguishable from a peristyle court, a private cloister. There was another early kind of atrium, used especially for winter apartments, in which the roof slanted upward like our roofs, instead of downward toward the centre, and shed the water instead of collecting it (*displuviatum*). The patrician and richer equestrian houses of the late Republic and Empire usually had two atria—first the old-fashioned kind (1; 2), for the transaction of business, and in front of it the shops; and beside and beyond it, the *alæ* and *tablinum*; then a peristyle atrium, with columns, with rooms opening on to it, where the family life was carried on. The later atria were beautifully decorated with frescoes and sculptures, vases and fountains. The best-preserved atria of all kinds are in the houses of Pompeii. The term was also sometimes used of religious or public buildings, in the form of courts, such as the Atrium Vestæ, attached to the house and temple of Vesta, and the Atrium Liberatis, which contained the first library founded in Rome.

In Christian antiquities, the atrium was a large columnar open court in front of the basilical churches, used for meetings or promenades, and even for *agapæ* and fairs. In the centre stood the fountain for ablutions. In it gathered the penitents who were not allowed in the church. These *atria* went out of use in the early Middle Ages. Those at Parenzo (Sixth Century), Sant' Ambrogio, Milan (Ninth Century), San Clemente, Rome (Eleventh and Twelfth centuries), and in the cathedrals of Capua and Salerno are the best preserved. In the monastic architecture of the early and Middle Ages, the cloister was evidently the atrium moved from the front to the side of the church, and reserved for the use of the monks. See CLOISTER.

ATROPATENE, ăt'rô-pȧ-tē'nê (Gk. 'Ατροπατήνη). The ancient name of the mountainous Persian Province of Azerbaijan, or Adarbaijān, to the west of the Caspian Sea. Its name is said to be due to Atropates, whom Alexander placed over the district in B.C. 328. In Pahlavi (q.v.) the name appears as Ataro-patakan. The principal city of the province, now as in antiquity, is Urumiah, on the lake of the same name.

AT'ROPHY (Gk. ἀτροφία, *atrophia*, want of nourishment; from ἀ, *a* priv. + τροφή, *trophē*, nourishment). A morbid condition of animal or vegetable life, resulting in deficient nutrition of the body, or part of the body, and a consequent decay and waste of its substance. The term is not applied to the mere withholding the requisite supply of nutriment, but to the condition produced by various diseases that affect the body. See NUTRITION; DIGESTION, ORGANS OF; DYSPEPSIA; HYPERTROPHY.

AT'ROPINE (derived from *Atropos*), or DATURINE, $C_{17}H_{23}NO_3$. An alkaloid prepared from the deadly nightshade (*Atropa belladonna*). The plant contains the alkaloid *hyoscyamine*, which is readily converted into atropine on addition of potash to the juice. The atropine thus produced is extracted by shaking the alkaline liquid with chloroform. It is then transferred from the chloroform solution into sulphuric acid by simply shaking the chloroform solution with the diluted acid; finally, when the sulphuric acid is neutralized with potassium carbonate, atropine is precipitated and may be purified by crystallization from hot alcohol. Atropine itself is insoluble in water: its sulphate, however, is readily soluble and is commonly used in medicine to produce dilatation of the pupil of the eye, also as an antispasmodic in whooping-cough, etc. It acts as a narcotic, and is exceedingly poisonous, half a grain of it being positively fatal. The symptoms of atropine poisoning are: rapid pulse, dry and flushed skin, dryness of the throat, etc. In cases of atropine poisoning, energetic stimulation of the skin and a hypodermic injection of pilocarpine and stimulants are recommended, after using the stomach pump. The principal physiological effect of atropine is reduction of the excitability, and eventually paralysis of the motor nerves, resulting in inability to move. See BELLADONNA.

AT′ROPOS (Gk. Ἄτροπος, 'the inflexible, unbending,' from ἀ, *a* priv. + τρέπειν, *trepein*, to turn). One of the *Mœræ*, or Fates—she who severs the thread of man's life. In late art she is represented with a cutting instrument, or a pair of scales, or a sun-dial. See PARCÆ.

ATRY′PA (Gk., 'holeless,' from ἀ, *a* priv. + τρῦπα, *trypa*, a hole). A name applied by Dalman in 1827 to a group of fossil brachiopods, the shells of which were by him supposed to be without a foramen in beak of the ventral valve. Under the early diagnosis the genus held a large number of species of various internal structure and exterior ornamentation, which ranged throughout all geological formations from the Ordovician to the Cretaceous. More recently the generic term has been restricted to those forms closely allied to the original species, *Atrypa reticularis* of Linnæus, which Dalman used as the type of his genus. The best-known species of the restricted genus is this *Atrypa reticularis*, with its depressed ventral valve and its calcified brachial spires directed toward the centre of the swollen dorsal valve, which species is of interest by reason of its exceedingly long period of existence. It appeared in the earliest Silurian time, and with various modifications, characteristic of particular ages through which it lived, it continued to the end of Devonian time. Its life period is exceeded by that of only one other fossil, *Leptæna rhomboidalis*, and the study of its variations in time and space is of the greatest interest as affording an excellent example of the manner of evolution of new species; many of its varieties having continued to evolve along distinct lines until they became entirely unlike, in a specific sense, the original form from which they separated. See, for illustration, BRACHIOPODA.

ATSUTA, ȧt-sōō′tȧ. A town of Japan in the Prefecture of Aichi (Map: Japan, E 6). It is situated in the southern part of Honshiu, 4 miles by rail from Nagoya, of which it is practically a suburb. It contains a number of Shintoese temples, erected in the Seventh Century A.D., and modeled after the famous temples of Ise. In one of them is treasured the famous sword which forms part of the Imperial regalia of Japan. Population in 1898, 24,941.

ATTACHÉ, ȧ′tȧ′shȧ′ (Fr., attached). A subordinate or assistant, attached to the suite or company of a superior officer. In modern usage the term is practically confined to subordinate members of an embassy or legation. Military and naval attachés are officers of these two services accompanying the diplomatic representative of their country, with a special view to observing conditions and movements of interest to the military or naval administration at home.

ATTACH′MENT (Fr. *attachement*, from *à* Lat. *ad*, to + Bret. *tach*, Engl. *tack*, a nail). The legal process under which a sheriff or like officer takes a person or property into custody; or the proceeding under the process. An attachment against the person was used most frequently, either to compel the appearance of a defendant in an action, or to secure the attendance of a delinquent witness or juror, or to bring before a court one guilty of contempt. It was, and still is, employed in England as a process for the enforcement of decrees or orders in equity. It was rarely so used in common-law actions, because a judgment creditor who resorted to it forfeited his right to go against the debtor's property. In this country the seizure of the person of a debtor in a civil action is made generally under an order of arrest (q.v.), or an execution (q.v.) against the person. Attachment of the person for contempt of court is common, however, in this country.

The attachment of property is regulated by statute. It is not accorded to the creditor in an ordinary action for the recovery of a debt. To entitle him to this process he must show, generally, that the debtor is a non-resident of the State in which he asks for the process, or has left it with intent to defraud his creditor, or conceals himself or his property with like intent, or that he has removed, or is about to remove, from the State in order to defraud his creditors. In such cases the property is to be attached and taken into the custody of the law, so that it may be applied to the plaintiff's claim, if that is subsequently reduced to a judgment. An attachment is looked upon by our courts as a harsh and extraordinary remedy, one not known to the common law, and as a rule they are disposed to put a strict construction upon the statutes which authorize it. In admiralty, a vessel or other property against which a suit *in rem* has been instituted may be attached when the circumstances would not warrant an attachment in a State court. An attachment is spoken of as *domestic*, when it is employed against the property of a resident of the State in which it issues; as *foreign*, when the owner of the property seized is a non-resident, who evades the personal service of a summons in the action. Consult: Drake, *Treatise on the Law of Suits by Attachment in the United States* (Boston, 1891), and the works referred to under the titles ARREST; EXECUTION; FOREIGN ATTACHMENT.

ATTACK′ (Fr. *attaque*, the same in derivation as ATTACHMENT). A military operation against an enemy. It may apply to any action which brings one body of troops in battle in contact with another, but is more generally applied to a distinct military operation by which an enemy's position is assailed. Smokeless powder, magazine rifles, machine and rapid-fire guns, improved breechloading field and horse artillery guns, scientifically trained and more intelligent troops, have practically reduced the method of attack to a science. While there is in every system of tactics a clearly defined outline of 'attack formation,' its actual order or method will depend altogether on the general character and contour of the ground to be fought over and the military genius of the officer in command. Generally speaking, the attacking infantry force is divided into three bodies—firing line, supports, and reserves. Before the beginning of the actual attack, a reconnaissance is generally made by the cavalry and horse-artillery, and the position and strength of the defending forces discovered, together with all other information possible. If the defending forces have been compelled to occupy or have made the mistake of selecting a position which is open to attack on one or both flanks, the attack will be so arranged as to threaten them on the flanks as well as in front, a feint being made to cover the real point of attack, which will invariably be made wherever the defenders develop the greatest weakness. Any commanding eminence will be seized if possible by the attacking force, the heaviest ordnance placed there, and the defenders' position thoroughly shelled. The prelude to nearly every modern attack is an artillery duel, more or less prolonged. Once the infantry are within the artillery zone of fire, or actual contact with the defenders is made, cavalry cease to be much of a direct factor. The necessity frequently arising of reinforcing some distant part of the firing-line, however, has, among other causes, brought into existence mounted infantry. (See CAVALRY; and MOUNTED INFANTRY.) These troops have the mobility of cavalry, are practically infantry, and can reinforce speedily in circumstances that would be generally impossible to a marching infantry regiment.

The extended battle front made necessary by modern arms makes the handling of troops under fire both difficult and dangerous. The firing line is extended, followed by its supports, who are in as close a formation as circumstances will admit, while the reserves are still farther behind. The casualties of the firing line are made up from the supports. In the final charge, which is made by the firing line, reinforced by the entire supports and whatever of the reserve circumstances have rendered necessary, the defenders' position is rushed with the bayonet. In the event of failure, the reserves cover the retreat of the charging line, carrying on the advance if possible, or in any event covering the *point d'appui*. If successful, the reserve force completes the final rout of the defenders, prevents their reorganization, and, assisted by the cavalry (who are harassing the fleeing troops on the flanks and endeavoring to head them off), try to secure their guns, transport, stores, and munitions of war.

The modern attack is the point in which all minor 'actions' merge, the successful carrying out of which is frequently the decisive blow of the campaign. The danger and losses incurred in such an undertaking will depend largely on the skill the defenders have shown in their selection of a position, or the extent to which nature has favored them. A recent example is the successful attack on the Spanish lines at Santiago, Cuba, by the American forces under General Shafter, in the Spanish-American War of 1898, an action where the Spaniards had every advantage of position and cover. Examples of good and bad positions may be found in the Anglo-Boer War of 1899-1902. Ladysmith, whose defense was necessary on account of the valuable stores located there, sustained one of the most terrible sieges of modern times. The position (which was forced upon the British General White) was directly under the fire of the Boer artillery, and could have been taken eventually had the Boers been as skillful as they were courageous. The position chosen by the Boers at the battle of Modder River had every possible natural advantage, and was very cleverly selected. One of their flanks and their front were protected by a swift-flowing and swollen river, which afforded few if any fording-places, while the other flank rested on an impassable range of mountains. Their front also had a practically impregnable character, owing to the steep kopjes. Held by trained troops, the position would have been impregnable, as the British had to advance along an open plain and were exposed to the formidable fire of the Boers. The position was eventually taken, after repeated failures, with terrible losses. The time generally selected for attack is at dawn, if possible, to surprise the enemy, but principally to escape the danger of the intervening fire zones. See BATTLE; TACTICS, MILITARY.

ATTACK. In music, a technical term meaning the spirit and style with which a performer, singer, or musical organization begins a phrase.

ATTAIN'DER (OF. *ataindre*, to accuse, convict). The immediate, inseparable consequence, at common law, of a judgment of outlawry for a capital offense, or of a judgment of death for treason or felony. It did not follow upon conviction; for, says Blackstone, "after conviction only, there is still a possibility of the accused's innocence. Something may be offered in arrest of judgment, or the indictment may be quashed, or he may be pardoned, or allowed the benefit of clergy. But when judgment is once pronounced, both law and fact conspire to prove him completely guilty. Then it is clear beyond all dispute that the criminal is no longer fit to live, but is to be exterminated as a monster and a bane to human society, and the law sets a note of infamy upon him, puts him out of its protection, and takes no further care of him than barely to see him executed. All his civil rights are extinct, for by an anticipation of his punishment, he is already dead in law." The first consequence of attainder, therefore, was the forfeiture of all the victim's property. This forfeiture, in the case of lands, related back to the time when the crime was committed, so as to avoid all intermediate sales and incumbrances. In the case of goods and chattels, attainder had no such retroactive effect. But common-law attainder did not stop with the forfeiture of the condemned criminal's estate. It produced 'corruption of blood, both upward and downward, so that the attainted person could neither inherit property from his ancestor' nor retain that of which he was in possession, nor transmit it to an heir, nor be the medium through which descent was legally traceable. These consequences of attainder have been modified in England by statute. The forfeiture or escheat of real estate was limited to cases of attainder for treason or murder by 54 Geo. III., chap. 145; and by 33 and 34 Vict., chap. 23, attainder and corruption of blood were abolished, while forfeiture and escheat were limited to judgment of outlawry.

The Constitution of the United States provides that "The Congress shall have power to declare the punishment of treason; but no attainder of treason shall work corruption of blood, or forfeiture, except during the life of the person attainted" (Art. III, Sec. 3). Similar provisions are embodied in some of the State constitutions. In other States, not only the corruption of blood, but all forfeitures of property consequent upon criminal judgments against the owners, are abolished. The United States Supreme Court has declared that the constitutional provision quoted above was introduced for the benefit of the children and heirs alone. It was a declaration that the children should not bear the iniquity of the fathers. Accordingly, if a traitor's property is confiscated by the United States, no interest is left in him that he can convey by deed, and his heirs take the inheritance at his death. Attainder consequent upon legislative enactments will be considered under BILL OF ATTAINDER. Consult: Blackstone, *Commentaries on the Laws of England;* Stephen, *New Commentaries on the Laws of England* (13th edition, London, 1899); and the authorities referred to under the titles CRIMINAL LAW; FORFEITURE; and CONSTITUTIONAL LAW.

ATTAINDER, BILL OF. See BILL OF ATTAINDER.

ATTAINT', WRIT OF (for derivation, see ATTAINDER). A proceeding in the nature of an appeal from a judgment entered upon the verdict of a jury. Under this writ, a jury of twenty-four was summoned to determine whether the first jury gave a false verdict. After the right of jurors to return a verdict according to their own consciences was established by Bushell's Code in 1670, and motions for new trials came into use, this proceeding was seldom resorted to. In 1757 Lord Mansfield said: "The writ of attaint is now a mere sound in every case." It was abolished in 1825 by 6 Geo. IV., chap. 50, sec. 60, except as to jurors guilty of embracery (q.v.). Consult Blackstone, *Commentaries on the Laws of England* (Oxford, 1765-68).

AT'TALE'A (named from the gorgeousness of its growth; see ATTALUS III). A genus of palms, comprising about 20 species, natives of the tropical parts of South America. They have in general lofty cylindrical smooth stems, but there are some stemless species. The leaves are large and pinnate. The fruit has a dry fibrous husk, inclosing a nut with three cells and three seeds. The leaves of some species are much used for thatching, and are woven into hats, mats, etc. The nuts of *Attalea excelsa* and of *Attalea speciosa* are burned to dry the india-rubber obtained from the *Siphonia elastica,* which acquires its black color from their smoke. The leaf-stalks of *Attalea funifera,* which is found in the southern maritime provinces of Brazil, and there called Piassaba, yield a fibre much used for cordage. The ropes made of it are very strong, and extremely durable in salt water. The Piassaba palm of the northern parts of Brazil, however, is totally different, and much of the Piassaba fibre imported into Great Britain is obtained from it. The fruit of *Attalea funifera,* known by the name of Coquilla-nut, is as large as an ostrich's egg, and supplies a kind of vegetable ivory, used for making umbrella handles, etc. The fruit of *Attalea compta,* the pindóva or indajá palm, is of the size of a goose's egg, and the kernels are eatable. It is a stately and beautiful tree, with a wide-spreading crown. *Attalea cohune* is a native of Honduras, where the oil of its fruits is used for soap-making and is exported for the same purpose.

AT'TALI'A (Gk. 'Ατταλεία, *Attaleia*). A city of ancient Pamphylia, on the south coast of Asia Minor, now called Adalia, at the head of the Gulf of Adalia. It was founded by Attalus II., King of Pergamon (B.C. 159-38). In Roman times it was an important seaport, being situated on the great trade and military route connecting the northwestern districts of Asia Minor with its southern coast. The Apostle Paul sailed from Attalia to Antioch, of Syria, on his return from his first missionary journey (Acts xiv. 25). Unlike many of its neighbors, Attalia has maintained its relative importance to the present time.

AT'TALUS (Gk. Ἄτταλος, *Attalos*). Uncle of Cleopatra, the wife of Philip II. of Macedon, and general under Philip. At Philip's wedding he insulted Alexander, the son of Olympias, and thereby helped bring about a separation between father and son. After the death of Philip, he undertook to oppose Alexander, but was finally dispatched by the latter's order.

ATTALUS I., called SOTER (B.C. 269-197). King of Pergamon from B.C. 241 to 197. Just before he became king, or in the first year of his reign, he gained a decisive victory over the Galatians, and by B.C. 226 he had made himself master of the whole of Asia Minor west of Mount Taurus. He soon, however, lost most of his conquests. Later he became an ally of Rome against Philip V. of Macedon. Attalus was a wise and just ruler and a friend of the arts and sciences.

ATTALUS II., surnamed PHILADELPHUS (B.C. 220-138). King of Pergamon. Before coming to the throne he gained distinction as a brave and able military leader, and was on several occasions sent as ambassador to Rome. He succeeded his brother Eumenes, B.C. 159. He founded Philadelphia, in Lydia, and Attalia, in Pamphylia, and was a generous patron of the arts.

ATTALUS III., called PHILOMETOR (B.C. 171-33). The son of Attalus II. and Stratonice, wife of Eumenes II. He was adopted while still a boy by Eumenes. He became King of Pergamum in B.C. 138. As a king he is known to us chiefly for the extravagance of his conduct and the murder of his friends and relatives. On the other hand, he is represented as a dilettante in literature and art. He was sunstruck while supervising the erection of a monument to his mother, and died of fever. His will made the Roman people his heirs, whence his name became proverbial for munificence and splendor.

ATTALUS, FLAVIUS PRISCUS. A personage who for one year (409-10) was Emperor of the West. He was the first to be raised to that office solely through barbarian influence, being proclaimed by Alaric and his Gothic army after the second surrender of Rome, when Honorius was deposed. The barbarians set Attalus up at Ravenna, whence he sent a message to Honorius commanding him to leave the throne, retire to a desert island, and cut off his feet. But Alaric soon wearied of him, and he was deposed. After Alaric's death, Attalus remained with Ataulphus, where he celebrated as a musician the nuptials of Placidia. Ataulphus put Attalus forward again as a rival emperor during the insurrection of Jovinus, but he was taken prisoner and brought to Honorius, who inflicted on him a part of the sentence he had written for the Roman Emperor. He cut off his thumb and forefinger, and banished him to the island of Lipari.

AT'TAR OF RO'SES, or **OTTO OF ROSES**. The volatile oil of the petals of some species of rose. It is a nearly colorless or light yellow crystalline solid at temperature below 80° F., liquefying a little above that temperature. It is imported from the East, where, in Syria, Persia, India, as well as in Turkey and Bulgaria, roses are cultivated to a considerable extent for the sake of the attar. In recent years it has also been prepared on a considerable scale in the northern European countries. The oil has been obtained from several species of rose. The *Rosa centifolia* is cultivated in Western Asia; the *Rosa damascena* is cultivated in Bulgaria. To procure the attar the rose petals are usually distilled with about twice their weight of water, and the distillate is exposed to the cool night air in open vessels, from which the thin film of attar is skimmed with a feather in the morning. One part, by weight, of the oil is obtained from 3000 parts, by weight, of rose-petals. Attar is said to have been first procured by what may be called an accidental distillation, rose-petals having been exposed with water to the heat of the sun, and to have been found floating on the surface of the water; and it is still sometimes obtained in India by such a process. It is said to be also obtained by dry distillation of rose-petals at a low temperature. During the distillation of rose-petals a small quantity of a solid volatile oil comes over (solid oil of roses, see below), which crystallizes and floats on the water in the receiver, and which is sometimes called *English oil of roses*. Attar of roses is not unfrequently adulterated with sandal-wood oil, oil of rhodium, geranium oil, etc. It is much used for making hair-oil, a drop of it being enough to impart a pleasant odor to a considerable quantity. It is also used in making lavender-water and other perfumes. The odor of attar itself is too powerful to be altogether pleasant. Attar of roses is a mixture of two substances, the one solid at ordinary temperatures and the other liquid. The solid oil of roses (rose-camphor, stearopten of oil of roses) possesses no odor, is insoluble in alcohol, but soluble in ether. It is composed of carbon and hydrogen. The liquid oil of roses, called *rhodinal* (eleopten of oil of roses), is a very fragrant liquid, to which the attar of roses is indebted for its delicious perfume, and consists of carbon, hydrogen, and oxygen. Its composition is represented by the formula $C_{10}H_{18}O$, and it is believed to be identical with citral. The principal use to which attar of roses is put is as a perfume. Milk of roses and lavender-water owe their fragrance to the presence of the attar. A good receipt for oil for the hair is olive oil, colored by alkanet, and scented by a few drops of attar, and this is very generally sold under the name of attar of roses. Medicines are occasionally perfumed by attar of roses, and it is sometimes added to unguents and spirit-washes. See PERFUMERY.

ATTAVANTE, ät'tȧ-vän'tȧ (c.1455-c.1520). A Florentine artist, perhaps the greatest miniaturist or illuminator of the Italian Renaissance. His style is that of the classic Middle Renaissance, with decoration borrowed from sculpture. His finest work was done for Matthias Corvinus, King of Hungary.

ATTEMPT'. An act, done with intent to commit a crime, and tending, but failing, to effect its commission, is punishable as an attempt to commit that crime. In England it has been held that the act must have been such that, if no interruption had taken place, the intended offense would have been committed, and therefore, that one who, with intent to steal, put his hand into another's empty pocket, was not guilty of an attempt. Such is not the law in this country. The emptiness of the pocket prevented a theft, but the attempt to commit a theft was complete. See the works mentioned under CRIMINAL LAW.

ATTEN'TION (Lat. *ad*, to + *tendere*, to stretch, reach out, to direct one's self, strive). The problem of attention is distinctively a problem of modern psychology. It is, of course, possible, now that the study of attention has been systematically undertaken, and its part-problems discriminated, to find the germs of a psychology of attention in the descriptive works of the Eighteenth Century, to say nothing of still older treatises; just as it is possible, after Darwin, to find the germs of an evolutionary theory of life as far back as the old Greek philosophers. None the less, the analysis and measurement of the attentive state are an achievement of the second half of the Nineteenth Century; and if there were no other justification for the much-abused phrase 'the new psychology,' we have its sufficient warrant in the addition of this vast area of previously unexplored territory to the psychological domain. Attention, which in the psychologies of the Associationist School, down to and including the monumental works of Bain, is either wholly neglected or passed over with a few general remarks, now forms the subject of a large monographic literature, has a chapter of its own in the text-books of the science, and holds the foremost place in many recent psychological systems.

We shall best understand the nature of the attentive consciousness, and of the problems which it sets for solution, if we set out from a concrete instance. Suppose that the mail brings me the latest popular novel, a book that I have for some time wished to read, and that I have heard constantly discussed by my friends. I know that I ought to work at other things, but I succumb, after a struggle, and sit down to the open book. At first I read hesitatingly and with effort; my neglect of duty still forces itself upon me from time to time, and I find the early chapters of the book difficult to follow. Presently, however, I become interested; later still, I become absorbed, oblivious to everything save the fortunes of the hero and heroine. I read on until the book is finished, and then wake up, almost with a start of surprise, to the business of the real world. What has happened, that is of psychological moment, during this experience?

In the first place, the general state or condition of my whole consciousness has changed. In the older psychologies the phrase 'state of consciousness' is used as the equivalent of what is now termed, more correctly, 'mental process': ideas and emotions and desires were referred to as 'states of consciousness.' What is here meant is something very different. We speak of the 'state' of consciousness, in strict usage, in the sense in which we speak of the state of the roads, as good or bad; or of the state of a man's affairs, as flourishing or embarrassed; or of the state of his health, as robust or shattered. Now it is clear that the state or disposition of consciousness, in discursive thought or reverie, differs from its state, understood in this way, in concentrated attention. In the former case, all the ideas which constitute the consciousness are on the same level, of the same mental value; in the latter, some ideas (those held at the focus of attention) are super-eminently 'robust' or 'flourishing,' while the ideas not attended to are depressed, relegated to the background. Here, then, is a matter that requires accurate analysis. Secondly, there is a marked difference of mental experience, as the distracted, thwarted attention with which we begin the reading of the novel passes into the rapt and absorbed interest with which we continue to read. We are attentive in both cases; but if we are to judge by what we 'feel,' we can hardly give the same name, without qualification, to the two states of consciousness. In other words, there seem to be various forms or kinds of attention. Thirdly, the change of conscious state which comes with the concentration of attention brings with it a characteristic change of bodily attitude. We should all recognize a picture or statue that portrayed the scout (i.e. the attitude of visual attention), or the eavesdropper (the attitude of auditory attention). These attitudes naturally give rise to certain characteristic groups of organic sensation—of sensations from skin and muscle, tendon and joint; and we shall therefore expect to find such sensations playing a constant and important part among the sense-processes that form the background of the attentive consciousness.

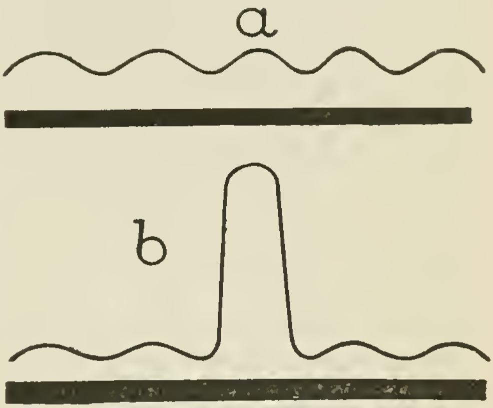
We will take up these topics in order, beginning (1) with attention as a state of consciousness. What are the essential features of the attentive state? (a) The ideas attended to are more clear and distinct than the ideas simultaneously present, but neglected by the attention, or, as we may say, attended from. The processes at the focus of attention are readily discriminated; the ideas of the background are obscure. (b) If the ideas attended to are intrinsically weak, they are strengthened or intensified by attention. A faint sound or light is rendered louder or brighter as we attend to it. No such intensification is observable in the case of ideas whose stimuli are intrinsically strong. (c) If the ideas attended to are fleeting and transient, they can be lengthened, made more durable, by attention. No such lengthening is observable in the case of ideas whose stimuli are stable and permanent. Lastly, (d) the ideas attended to are more valuable for the general mental life than are the ideas attended from: they are more easily and certainly revivable, in memory and imagination. It is a commonplace of education that if we wish a child to remember something, we must make him attend to it. This fourth characteristic is, evidently, of a different order from the three preceding. It is a result or after-effect of the others, and more especially of (a).

As to the physical basis of these changes in consciousness, it has long been known that certain nervous impulses within the central nervous system have the power of inhibiting or arresting other impulses; thus, excitation of the vagus (pneumogastric, or tenth cranial) nerve inhibits the beating of the heart (Weber). Now we can account for some of our observed phenomena by a theory of inhibition. When e.g. a weak mental process is strengthened, or a transient process lengthened, we may well suppose that the effect is due, not to any positive reinforcement or temporal extension of the process in question, but simply to the simultaneous arrest of other and conflicting excitations within the nervous system. Attention, that is to say, allows the weak or transient process to come to its full intensive and temporal rights in consciousness by keeping down other nervous impulses whose tendency is still further to weaken or curtail that process. Attempts have been made, in the same way, to explain the growth of clearness and distinctness in the ideas attended to by assuming an inhibition of conflicting ideas; so that the clearness of the attentive state would represent the normal or natural clearness of the idea, the clearness which it can attain when its development is not hindered by rival ideas. Physiologists, however, have recently discovered that, just as certain nervous impulses may arrest other impulses, or block paths of nervous discharge, so may certain impulses reinforce others, or open up paths of nervous discharge; the negative fact of inhibition is paralleled by the positive fact of facilitation. There seems to be no reason why we should not avail ourselves of this discovery for our theory of attention. The clearness of the idea attended to would then depend partly upon the arrest of conflicting ideas, but partly also upon an actual enhancement of the focal idea by the reinforcing nervous impulses. Such a view accords better with the observed mental phenomena than does the view which regards all the aspects of the attentive state as symptoms of neural inhibition. On the question of the primary seat of the inhibitory and facilitating impulses, no more can at present be said than that it is, probably, to be sought in the 'association centres' of the cerebral cortex. (See NERVOUS SYSTEM AND BRAIN.)

Two special questions arise out of the foregoing discussion. We may ask, in the first place, how long the state of attention continues? for how long a time an idea or group of ideas may remain poised at the apex of conscious clearness? And we may ask, secondly, how large the group of ideas attended to may be; inquiring now into the range of attention, as we have before inquired into its duration. Both questions have been submitted to the test of experiment. It has been found, (a) that the state of attention is not continuous, but intermittent. Suppose that we look attentively at a faint gray patch on a white surface, or listen attentively to the faint hiss of a gas-flame. If the attention remains steady, the gray and the hiss will also remain steadily in consciousness. If, on the other hand, the attention fluctuates, there will be moments when the gray and the hiss undergo a loss of clearness; and since they are, at the best, only just visible and just audible, the loss of clearness will mean a loss of existence: the gray will merge into the white and the hiss will cease to be heard. The second alternative is realized. The gray appears, and is washed out, and appears again, at intervals of a few seconds; and the sound of the flame is heard, ceases, and then is heard again, in precisely the same way. The average length of the single 'pulse' of attention—the time counted from appearance to reappearance, or from disappearance to the next following disappearance of the stimulus—is five or six seconds. (b) The range of attention is most easily determined by the aid of visual stimuli. A number of letters, e.g. chosen at haphazard and set in a space that falls well within the observer's range of vision, are shown upon a screen for so short a time that wandering or roving of the attention from letter to letter is prevented. Under such conditions it is possible to grasp, by a single 'act' of attention, some five or six separate impressions. If short and familiar words are exhibited, in place of the mixed letters, some four or five of these will be grasped by the attentive consciousness. The number of discriminable ideas present at the same time with the four or five focal ideas in the background of consciousness cannot, in the nature of things, be accurately ascertained. (See CONSCIOUSNESS.)

The physical basis of the intermittence of attention may be sought in the mode of functioning of the nerve-cell. The cell is said by physiologists to 'discharge.' We may interpret the term literally, for the nerve-cell is a storehouse or reservoir of nervous energy, and gives off this energy when the appropriate stimulus arrives, not continuously or piecemeal, but all at once, by way of explosion. Now an exploded cell must be recharged before it can function again, and the period of recharging apparently corresponds to the periods of disappearance of the pale gray and the faint hiss of which we have spoken. In explanation of the limited range of attention, we can say no more than that the small group of ideas comprised within it represent the available energy of the total cortex, as directed upon the given stimuli; the fact of limitation must be considered as an ultimate fact of the psychophysical organization.

(2) We pass to the question of the various forms or kinds of attention. It may be said at once that there is but one attention. The essential features of the attentive state are, always and everywhere, as we have just described them. The differences between one bit of attentive experience and another are differences, first, in the determination or motivation of attention; and secondly, in the sense-processes which are set up by the attentive attitude. We deal now with the determinants of attention. (a) There are certain stimuli and forms of stimuli which command our full and immediate attention. Thus, very intensive stimuli compel us to pay regard to them. However interesting our novel may be, we shall start up, automatically and unhesitatingly, if a gun is fired outside of the window of our room. We have no choice but to attend to the sudden, loud sound. Intensity, suddenness, novelty, movement—all these properties of stimuli are attention-compelling. The moving bird that flits across the landscape; the moving voice that rises and falls to the more stationary orchestral accompaniment; the moving stimulus in the field of touch—these things hold our attention whether we will or no. There is good physiological reason for the power of such stimuli, inasmuch as all alike are fitted by their attention-compelling properties to exert a marked influence upon nervous substance. There is also good biological reason for their efficacy. An animal so constituted as to leave unnoticed the sudden and novel and moving features of its surroundings would soon pay the forfeit of its neglect with life. This 'primary passive attention,' or 'involuntary attention,' is, then, a heritage from earlier and less secure conditions of living. Our ancestors could not have survived without it, and it persists, ingrained in our nervous constitution, even though in civilized communities the reason for its continuance has largely disappeared. (b) This single and masterful determination of attention, however, cannot persist unchanged. The organism grows in complexity; its sense-organs multiply. And this means that there may be rival claimants, so to speak, for the favor of attention. Suppose that eye and ear are simultaneously called upon—the eye by a moving object in one direction, the ear by an intensive sound proceeding from a different quarter. There will, evidently, be doubt and conflict, of a piece with the doubt and conflict that are set up by the occurrence of a number of potential motives to selective action. (See ACTION.) Furthermore, as the retrospective functions develop, and the mind is stocked with memories, each of the would-be determinants of attention will form a centre of association; ideas will cluster round it, some to help and some to hinder. So we reach the stage of 'active' or 'voluntary attention'—the sort of attention that we give to a new game of skill that we are learning or a new problem that we are seeking to solve. Here the attention is divided; no single set of ideas receives a full measure of it: there is effort and struggle and misdirection of energy. Again, however, attention cannot persist, unchanged, at this level.



a represents an inattentive, and *b*, an attentive consciousness. In *a* are five ideas, all proceeding at equal levels. In *b*, the third idea is being attended to, and its wave length is increased, while the wave lengths of the others are depressed.

If the struggle be continued active attention passes, inevitably, into (c) 'secondary passive attention.' Just as the selective action slips back, with repetition, into a secondary reflex, so does active attention presently fall under the exclusive dominance of some one of the rival determinants. We begin the novel voluntarily, in face of conflicting duties. As we read we grow absorbed in the story. What is this 'absorption' but a reappearance of primitive attention upon a higher plane of mental development? The attention-compelling property of the successful stimulus is no longer intensity or novelty, but something much more subtle. It is the relation of the stimulus in question to the whole content of consciousness. As soon as our mind is set for the plot of the novel, and all intruding ideas have been banished, the incidents, as they come, have full sway over us; we are prepared for them, ready to receive them; they fit in with our mental trend and tendency. Every trained mind is thus dominated by the objects which appeal to its training; the poet, by works of the creative imagination; the physician, by the details of a new treatment; the painter, by an effect of color upon the landscape; the zoölogist, by the forms of animal life. We can never transcend the dictates of the primary passive attention; the most absorbed reader, the most abstracted thinker, starts at the sound of the gun. But our intellectual life, when it has reached the stage of achievement, is in the main a life of secondary passive attention. From the educational point of view the stage of active attention is a stage of waste, of non-attainment; mastery comes with secondary passive attention. But, then, there is no road to this last save through active attention: work comes before play. The child must be led to work in order that his play, in adult life, may be of the highest possible service to society.

(3) Little need be said of the sense-processes that are aroused by the bodily attitude of attention, the strains and pressures that come to consciousness from eye or ear, as the attention is visually or auditorily directed. Some psychologists, envisaging attention as a purely motor phenomenon, have laid much stress upon these muscular adjustments; and there can be no doubt that they help to induce and to maintain the attentive state. But while this is true, it seems to be equally certain that the sensations which proceed from the adjustments are merely secondary characteristics of the attentive consciousness. As Kuelpe puts it, they are consecutive, not constitutive. They contribute largely to the experience of effort in active attention. And it is interesting to notice, as Fechner and James have done, the change of direction which this effort undergoes, according as the object of attention belongs to the world of things or to the world of thought. In the former case it is a straining outward; in the latter, a strained retraction or withdrawal inward. Further study of the sensations, however, throws no new light upon the mechanism of attention.

Bibliography. W. James, *Principles of Psychology* (New York, 1890); O. Kuelpe, *Outlines of Psychology* (London, 1895); W. Wundt, *Grundzüge der physiologischen Psychologie* (Leipzig, 1893); Th. Ribot, *La psychologie de l'attention* (Paris, 1889); E. B. Titchener, *Experimental Psychology* (New York, 1901). See Apperception; and (for the relation of attention to affection) Will. See also Psychological Apparatus.

ATTERBOM, ät'tĕr-bōm, Per Daniel Amadeus (1790-1855). A Swedish poet. He was born at Åsbo. As a student he fell under German literary influence, and was a founder of the *Musis Amici*, a student society which, under the name of *Aurora League*, helped to emancipate Swedish literature from the dominance of French academic tradition, through its organs, *Phosphorus* (1810-13), *Poetic Calendar* (1812-22), and *Swedish Literary News* (1813-24). Broken in health by overstudy, Atterbom visited Germany and Italy in 1817-19, where he met Schelling and Thorwaldsen. On his return he became (1820) instructor of the Crown Prince Oscar, and (1828) professor of philosophy at Upsala. In 1839 he was made Academician. He wrote critical literary essays, *Swedish Seers and Poets*, a collection of lyrics, *The Flowers*, in which he introduced the sonnet to Swedish poetry, an unfinished but exquisite fairy drama, *The Blue Bird*, and the very popular romantic drama, *The Isle of Blessedness* (1823). He possessed rare poetic gifts, but introduced into his verses metaphysical and religious speculation.

AT'TERBURY, Francis (1662-1732). Bishop of Rochester. He was born at Middleton Keynes, near Bedford, England, March 6, 1662, and educated at Westminster School, London, from which, in 1680, he passed to Christ Church, Oxford. In 1687 he gave proof of that ready controversial talent which distinguished him through life, in a reply to a pseudonymous attack on Protestantism by Obadiah Walker, Master of University College, under the name Abraham Woodhead, and in the same year received holy orders. In London his rhetorical powers soon won him reputation. He became lecturer of Saint Bride's (1691), a royal chaplain, and minister of Bridewell. In 1698 a temporary sensation was created in the learned world by the appearance of the Hon. Charles Boyle's *Examination of Dr. Bentley's Dissertations on the Epistles of Phalaris and the Fables of Æsop*, in which he defended the Epistles, though all the world now knows that they are forgeries. This clever but shallow and malicious performance was in reality composed chiefly by Atterbury, who had been the young nobleman's tutor at Christ Church. In 1700 he distinguished himself in a controversy with Dr. Wake and others regarding the powers and privileges of convocations. Atterbury's zealous and caustic defense of the ecclesiastical against the civil authority procured him the thanks of the lower house of Convocation and the degree of D.D. from Oxford (1701); also the archdeaconry of Taunton. In 1704 he was promoted to the deanery of Carlisle, on which occasion he subjected himself to just obloquy by attempting to procure an alteration in the date of his predecessor's resignation, which happened to interpose a temporary obstacle to his appointment. In 1707 he was made a canon of Exeter; in 1709, preacher at the Rolls Chapel; in 1710 he was chosen prolocutor to the lower house of Convocation, and in the same year he had the chief hand, according to the common belief, in drawing up the famous defense of Dr. Sacheverell; in 1712 he became Dean of Christ Church, where, however, his turbulent and combative spirit had meanwhile involved him in so many controversies that there was no peace until he was removed; in 1713 he was made Bishop of Rochester and Dean of Westminster. It was supposed—not unreasonably—that Atterbury aspired to the primacy; but the death of Queen Anne extinguished his hopes in that direction. His known character and Jacobite leanings made him no favorite with George I. In 1715 he refused to sign the bishops' declaration of fidelity, and some of the most violent protests of the peers against the Government measures proceeded from his reckless pen. His deep complicity in a succession of plots for the restoration of the Stuarts brought down upon him at length the charge of treason, and in August, 1722, he was committed to the Tower. A bill of pains and penalties was brought into the House of Commons, and passed in the Lords by a majority of 83 to 43. Atterbury, who had defended himself with great ability, was deprived of all his ecclesiastical offices, incapacitated from holding any civil or spiritual office in the King's dominions, and condemned to perpetual banishment. The people generally considered him a martyr. In June, 1723, he quitted England for France, and after a short stay at Brussels, finally settled at Paris, where he died February 15, 1732. In his exile he maintained a constant correspondence with his friends, and took an active part in the abortive conspiracies of the Jacobites. His fame as a writer is founded on his sermons, and his letters to Pope, Swift, and others; as a letter-writer, indeed, he has seldom been surpassed. Consult his *Memoirs and Correspondence*, edited by F. Williams (London, 1869).

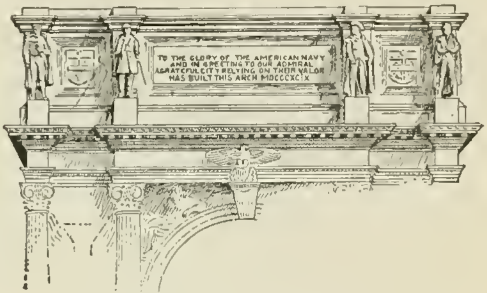
ATTERBURY, William Wallace (1823—). A Presbyterian divine, born at Newark, N. J. He graduated at Yale College in 1843 and at Yale Theological Seminary in 1847. He organized and was pastor of the Presbyterian Church at Lansing, Mich., from 1848 to 1854, and at Madison, Ind., from 1854 to 1866. In 1869 he became secretary of the New York Sabbath Committee. He is the author of numerous documents, speeches, and reports, and has been active in the cause of Sunday observance.

ATTERSEE, ät'tēr-zā, or **KAMMERSEE**, käm'mēr-zā. A lake in the southwestern part of Upper Austria, situated in longitude 13° 30′ E., about 1500 feet above the sea. It is over 11 miles long, from one to two miles in breadth, and occupies an area of 17 square miles. It is surrounded by mountains, and the scenery is remarkable for its picturesqueness. A number of health resorts are situated on the shore. The lake is well stocked with fish. It has been navigated by steamers since 1869.

AT'TESTA'TION (Lat. *ad*, to + *testis*, a witness). The verification in writing of the execution of deeds and wills by witnesses. Hence the clause at the end of these instruments, which immediately precedes the signatures of the witnesses, is called the attestation clause. See Deed; Will; Witness.

ATT'FIELD, John (1835—). An English chemist, born in Hertfordshire. He was professor of practical chemistry to the Pharmaceutical Society from 1862 to 1896. He contributed numerous articles on chemical topics to *Brande's Dictionary* and to the *English Cyclopædia;* was co-editor of the *British Pharmacopœia* in 1885 and editor in 1898; he is the author of *A Manual of Chemistry, General, Medical, and Pharmaceutical* (1898) and a large number of scientific papers.

AT'TIC (originally, in the chaste Attic style). A term in architecture, employed to designate a low story rising above the wall cornice that terminates the main elevation of a building, or a low story at the top of a building; in domestic architecture, it is usually applied to sky-lighted rooms in the roof. In classic architecture, it designates a decorative story above an entablature, as in the case of Roman triumphal arches, where the dedicatory inscription was in the centre of the attic.


TO THE GLORY OF THE AMERICAN NAVY
AND IN GREETING TO OUR ADMIRAL
A GRATEFUL CITY RELYING ON THEIR VALOR
HAS BUILT THIS ARCH MDCCCXCIX

ATTIC OF THE TEMPORARY DEWEY ARCH, NEW YORK.

ATTIC. Pertaining to Attica, characteristic of the people of Athens, or Attica. From the preëminence of Athens in Greek literature, from the Fifth Century B.C., the Attic dialect became the usual literary language, and exercised a powerful influence in the κοινή, *koinē*, or 'common' form of Greek, which developed after the time of Alexander the Great. In the First and Second centuries A.D. a revival of Attic took place among the so-called Atticists, of whom Dionysius of Halicarnassus and Lucian are conspicuous representatives. The tragedians, and perhaps Thucydides, seem to preserve traces of a somewhat older form of Attic dialect than that used by writers of the Fourth Century B.C. Sophocles was called 'the Attic bee,' from the sweetness of his compositions; the nightingale was the 'Attic bird,' because Philomel was the daughter of a king of Athens; Xenophon was styled the 'Attic muse' for eloquence in composition. 'Attic salt' indicates pungency of wit.

AT'TICA (Gk. Ἀττική, *Attikē*, earlier, Ἀκτική, *Aktikē*, from ἀκτή, *aktē*, headland, promontory, coastland). The eastern extremity of the mainland of Greece. It forms a triangular peninsula extending to the southeast into the Ægean Sea, washed on the southwest by the Saronic Gulf, and on the northeast by the strait separating it from Eubœa. On the north it is separated from Bœotia by Mount Cithæron (4620 feet) and its eastern continuation, and on the west from Megaris by a low range of hills. The soil of Attica is poor and the supply of water scanty, while the character of the coast tended to attract the inhabitants to the sea. But though Attica was always dependent on imported grain, the natural resources were considerable. Mount Pentelicon yielded an abundant supply of fine white marble, and the silver mines of Laurium, at the southern end of the peninsula, were a valuable property of the Athenian State, and can still be worked at a profit, the most valuable part of the yield now being, however, lead. Attica is much broken up by mountain ridges, and there are only two large plains, the Athenian, surrounded by Mounts Hymettus (3370 feet), Pentelicon (3640 feet), Parnes (4634 feet), and Ægaleos; and the Thriasian, around Eleusis, in the southwestern portion. The principal rivers, the Cephissus and Ilissus, both in the Athenian plain, are mere winter torrents, dry in summer, when no rain falls for four months. In the modern administration, Attica forms one of the nomes of Greece.

The ancient Athenians claimed that their ancestors were *autochthones*, 'sprung from the soil,' and it is certain that Attica does not show the same evidences of invasion that are found in other Greek States. It is also certain that the Athenians were a branch of the Ionic division of Greek-speaking peoples; but there is no general agreement among scholars as to the time or manner of their occupation of the country. It seems clear that originally Attica was inhabited by a number of independent clans, bound together in a loose confederacy, which was changed either by a gradual process, or more probably by an Athenian king, into a real unity under the lead of Athens. This union was attributed in Athenian legend to Theseus (q.v.), and was so thoroughly accomplished that the history of Attica is only that of Athens, while the only name for the inhabitants is Athenians. Eleusis alone seems to have preserved an independent position until a comparatively late date. The villages, or *demes*, which were scattered through the country, were reorganized by Clisthenes (B.C. 509), who divided them among his ten tribes so that each tribe contained demes from the plains, the mountains, and the coast, thus destroying the last traces of local parties, and completing the centralization of the Athenian State. The remaining history of Attica is that of Athens. Consult: Curtius and Kaupert, *Karten von Attika* (Berlin, 1881-97); and W. M. Leake, *The Topography of Athens and the Demi of Attica* (London, 1841). See ATHENS.

ATTIC MUSE, THE. A name given to Xenophon (q.v.), because of his style and because of the appreciation of and enthusiasm for the noble and beautiful which marked his character.

ATTIC NIGHTS. See GELLIUS, AULUS.

ATTIC PHILOS'OPHER, AN. See SOUVESTRE, EMILE.

ATTIC SALT (Lat. *Sal Atticum*). A poignant, delicate wit, peculiar to the Athenians. In like phrase, the ruder Roman wit is called *Italian vinegar* (*Italum acetum*).

AT'TICUS, TITUS POMPONIUS (B.C. 109-32). One of the most noble and generous men in ancient Rome. He was born in B.C. 109, or a few years before the birth of Cicero. His excellent education, during which he enjoyed the companionship of Torquatus, the younger Marius, and Cicero, developed, at an early age, a love of knowledge, which was increased during his stay in Athens, where he remained many years, glad to be separated from the political distractions of his native land. After B.C. 65, when he returned to Rome, he still devoted himself chiefly to study and the pleasures of friendship, and refused to take any part in political affairs. Yet he was by no means without influence on public matters, as he lived on terms of familiar intercourse with several leading statesmen, and freely gave his counsel, which was generally sound and wholesome, while it was always benevolent. He was a man of great wealth, having been left a large inheritance by his father and his uncle, which he greatly increased by judicious mercantile speculations. His mode of life was frugal. When he was informed that a disorder under which he was laboring was mortal, he voluntarily starved himself, and died in B.C. 32. Among his personal friends Cicero held the first place. The *Annales*, written by Atticus, were highly commended by his contemporaries. They were especially valuable on account of containing genealogical histories of the old Roman families. Atticus was one of those men (not uncommon either in ancient or modern times) in whom fine culture and a fortunate social position had highly developed the faculty of good taste. He had no creative genius, but was possessed of such delicate discernment that he could detect the flaw which would have been invisible to Cicero. Every author was anxious to secure his favorable opinion. None of his writings has been preserved. His biography is found in Cornelius Nepos; and many facts concerning him in Cicero's *Epistles to Atticus*.

ATTICUS HERO'DES, TIBERIUS CLAUDIUS. (1) A rich Athenian who lived at the end of the First and beginning of the Second Century A.D. His father was found guilty of treason and his property confiscated; but Atticus found a rich treasure in a house, and the Emperor permitted him to keep it. He rose to high honor under Trajan and Hadrian, and was twice consul. (2) Son of the preceding, born about A.D. 101, at Marathon. Carefully trained by the best teachers, he became a noted rhetorician, and at Rome numbered among his pupils M. Aurelius and L. Verus. In A.D. 143 he was consul, but soon afterward returned to Athens. He added to the wealth inherited from his father by a marriage with Annia Regilla. He spent his money liberally in adorning the city of Athens, where he built a stadium of Pentelic marble, and the Odeum (a music hall), whose ruins still stand to the southwest of the Acropolis, in memory of Regilla. He also built an aqueduct and exedra at Olympia, a stadium at Delphi, a theatre at Corinth, and at Thermopylæ arrangements for sulphur baths. He contemplated a canal across the Isthmus of Corinth, but gave it up because Nero had tried and failed. He restored several of the partially ruined cities of Greece, where inscriptions testified the public gratitude to him. For some reasons the Athenians became his enemies, and he left the city for his villa near Marathon, where he died, A.D. 177. Nothing of his writing is known to exist.

ATTILA, ăt'tĭ-lȧ (Ger. *Etzel;* Hung. *Ethele,* conjectured to have been originally a title of honor). A king of the Huns, the son of Munzuk, a Hun of the royal blood. In A.D. 434 he succeeded his uncle, Roas, as chief of countless hordes scattered over the north of Asia and Europe. His brother, Bleda, or Blödel, who shared with him the supreme authority over all the Huns, was put to death by Attila in A.D. 444 or 445. The Huns regarded Attila with superstitious reverence; Christendom held him in superstitious dread, as the 'scourge of God.' He was believed to be armed with a supernatural sword, which belonged to the Scythian god of war, and which must win dominion over the whole world. It is not known when the name 'scourge of God' was first applied to Attila. He is said to have received it from a hermit in Gaul. The whole race of Huns were regarded in the same light. In an inscription at Aquileia, written a short time before the siege in 452, they are described as *imminentia peccatorum flagella* (the threatening scourges of sinners). The Alani, Ostrogoths, Gepidæ, and many of the Franks, fought under his banner, and in a short time his dominion extended over the people of Germany and Scythia—i.e. from the frontiers of Gaul to those of China. In 447, after an unsuccessful campaign in Persia and Armenia, he advanced through Illyria, and devastated all the countries between the Black Sea and the Mediterranean. Those inhabitants who were not destroyed were compelled to follow in his train. The Emperor Theodosius II. collected an army to oppose the inundation of the barbarians, but in three bloody engagements fortune declared against him. Constantinople owed its safety solely to its fortifications and the ignorance of the enemy in the art of besieging; but Thrace, Macedon, and Greece were overrun; seventy flourishing cities were desolated, and Theodosius was compelled to cede a portion of territory south of the Danube, and to pay tribute to the conqueror, after treacherously attempting to murder him. In 451 Attila turned his course to the west, to invade Gaul, but was here boldly confronted by Aëtius, leader of the Romans, and by Theodoric, King of the Visigoths, who compelled him to raise the siege of Orleans. He then retired to Champagne, and in the wide plain of the Marne—called anciently the Catalaunian Fields—waited to meet the enemy. Here the army of the West, under Aëtius and Theodoric, encountered the forces of the Huns. The engagement is known in history as the battle of Châlons. Both armies strove to obtain the hill of moderate height which rises near Mury, and commands the field of battle; and after a terrible contest, the ranks of the Romans and their allies, the Visigoths, were broken. Attila now regarded victory as certain, when the Gothic prince, Thorismond, immediately after his father had fallen, assumed the command, and led on the brave Goths, who were burning to avenge the death of Theodoric. Their charge from the height into the plain was irresistible. On every side the Huns were routed, and Attila with difficulty escaped into his encampment. This, if old historians are to be trusted, must have been the most sanguinary battle ever fought in Europe; for it is stated by contemporaries of Attila that not fewer than 252,000 or 300,000 slain were left on the field. Attila having retired within his camp of wagons, collected all the wooden shields, saddles, and other baggage into a vast funeral pile, resolving to die in the flames rather than surrender; but by the advice of Aëtius, the Roman general, the Huns were allowed to retreat without much further loss, though they were pursued by the Franks as far as the Rhine. (See AËTIUS.) In the following year Attila recovered his strength and made another incursion into Italy, devastating Aquileia, Milan, Padua, and other cities, and driving the terrified inhabitants into the Alps, the Apennines, and the lagoons of the Adriatic Sea, where they founded Venice. The Roman Emperor was helpless, and Rome itself was saved from destruction only by the personal mediation of Pope Leo I., who visited the dreaded barbarian, and is said to have subdued his ferocity into awe by the apostolic majesty of his mien. This deliverance was regarded as a miracle by the affrighted Romans; and old chroniclers relate that the Apostles, Peter and Paul, visited the camp of Attila and changed his purpose. By 453, however, Attila appears to have forgotten the visit of the two beatified apostles, for he made preparations for another invasion of Italy, but died of hemorrhage on the night of his marriage with the beautiful Ildiko (or Hilda). His death spread consternation through the host of the Huns. His followers cut themselves with knives, shaved their heads, and prepared to celebrate the funeral rites of their King. It is said that his body was placed in three coffins, the first of gold, the second of silver, and the third of iron; that the caparison of his horses, with his arms and ornaments, were buried with him; and that all the captives who were employed to make his grave were put to death, so that none might betray the resting-place of the King of the Huns.

Jornandes describes Attila as having the Mongolian characteristics—low stature, a large head, with small, brilliant, deep-seated eyes, and broad shoulders. There can be little doubt that circumstances conspired, in the case of Attila, to give a certain largeness to his barbaric conceptions, which made him a most formidable foe to the civilization of Europe. Consult: Gibbon, *Decline and Fall of the Roman Empire* (London, 1854-55); and Thierry, *Histoire d'Attila* (Paris, 1874). See also the article HUNS.

ATTIRET, ȧ'tê'rȧ', JEAN DENIS (1702-68). A French painter. He was born at Dôle, entered the Jesuit Order, and was sent as a missionary to China, where he became court painter of the Emperor Kien Lung, whose military exploits against the Tartars he treated in sixteen historical tableaux. These were reproduced in France by Cochin in the form of engravings. Attiret painted more than 200 portraits of Chinese court officials, and was the founder of a European school of painting at Peking. The title of mandarin was offered to him in 1754, but refused.

AT'TIS, also written **AT'TYS**, **A'TYS**, and **AT'TIN** (Gk. Ἅττις, Ἅττυς, Ἅτυς, and Ἅττιν). A Phrygian and Lydian divinity, worshiped in the temple of Cybele in common with this goddess. The myth of Attis is told in various ways. The form of the story given by Ovid is this: Attis was a beautiful shepherd beloved of Cybele, who imposed upon him the vow of chastity. Having broken his vow, he was made insane by the goddess, in which condition he unmanned himself. When, in consequence thereof, he attempted to kill himself, Cybele changed him into a fir tree, and decreed that henceforth her priests should be eunuchs. The myth represented the successive death and regeneration of nature, due to the changes of the seasons. The cult of Attis was native to Phrygia, but at an early date it spread into other parts of Asia Minor and the Greek islands. Traces of it appear at Athens as early as the Fourth Century B.C., and it was introduced at Rome, probably in conjunction with the cult of Cybele, in B.C. 204. After the official recognition of the cult by the Emperor Claudius, the festival of Attis was celebrated in March with great pomp. The story of Attis is the subject of a remarkable poem by the Roman poet, Catullus.

ATTIUS, ăt′tĭ-ŭs, or **ACCIUS**, ăk′shĭ-ŭs, LUCIUS (c.170-90 B.C.). A Roman tragic poet. He exhibited his first play at the age of 30, continuing from that time till his death his literary labors. He was perhaps the greatest of the Roman tragic writers. He wrote about 40 tragedies, of which only about 750 lines are extant. He composed also *Annales*, mythological histories in hexameter verse, *Didascalia*, a history of Greek and Roman poetry, and a work called *Pragmatica*, treating of literary history. He wrote also on agriculture. The extant fragments are edited by Ribbeck, *Tragicorum Romanorum Fragmenta* (Leipzig, 1897). See the monograph by Boissier, *Le poète Attius* (Paris, 1857).

AT′TLEBORO. A town in Bristol County, Massachusetts, 32 miles southwest of Boston; on the main line and on branches of the New York, New Haven, and Hartford Railroad (Map: Massachusetts, E 4). It comprises several villages, and contains a public library of 7500 volumes, an almshouse, and the Attleboro Home Sanitarium. The town manufactures jewelry, jewelers' supplies, buttons, silverware, cotton goods, cotton-goods machinery, yarn, carriages, leather, coffin trimmings, and shuttles. There are also extensive bleacheries and dye-houses, and gold and silver refineries and smelters. The government is administered by annual town meetings. The water-works are owned and operated by the municipality. Population, 1890, 7577; 1900, 11,335. Settled in 1669, and originally a part of Rehoboth, Attleboro (named from Attleborough, England) was incorporated as a separate town in 1694. Consult J. Daggett, *A Sketch of the History of Attleborough* (Boston, 1894).

ATTLMAYR, ä′t′l-mīr, FERDINAND (1829—). An Austrian naval expert. He was born at Hall, in the Tyrol, served with distinction in the navy, and in 1866 became professor at the Imperial Naval Academy of Austria. He produced a number of valuable works, principally on naval tactics, among which the following are the most important: *Die Elemente des Internationalen Seerechts* (1872); *Studien über Seetaktik und den Seekrieg* (1878); *Handbuch der Oceanographie und maritimen Meteorologie* (1883); *Ueber maritime Kriegsführung* (1884); *Der Krieg Oesterreichs in der Adria, 1866* (1896).

ATTORNEY, ăt-tûr′nĭ (OF. *atorne;* Low Lat. *attornatus*, turned to). A person to whom authority has been turned over or transferred to act for another. If the authority is conferred by a letter or power of attorney, he is called an *attorney in fact*, or an agent (q.v.). If he is authorized by law to represent persons employing him in legal proceedings, he is called an *attorney at law*. In the latter sense, it was confined in England, until recently, to lawyers practicing in the common law courts. Those practicing in equity courts were called solicitors (q.v.), while admiralty lawyers were known as proctors (q.v.). The Judicature Act of 1873 declared that all persons theretofore admitted as attorneys, solicitors, or proctors should be called solicitors of the Supreme Court, and that all persons thereafter admitted should have the same name. Accordingly, attorney at law is an obsolete term in England.

In this country, on the other hand, it is used as the general designation of the practicing lawyer, without regard to the court in which he exercises his functions, and without regard to the nature of those functions—whether they are those performed, on the one hand, by the English attorney, solicitor, and proctor, or, on the other, by the barrister (q.v.), counsel, and advocate. The qualifications of an attorney at law, and the mode of his admission to the bar, are fixed by statutes and by court rules. He is required, generally, to pursue a course of study, either in a law school or in the office of a practicing lawyer, to pass an examination, and to present credentials of a good moral character. His admission is by an order of the court, which has the force of a judicial determination of his fitness and of his authority as an attorney and counselor. Upon this determination he becomes an officer of the court, subject to its control, and responsible to it for misconduct. He is not a public official, nor is he the possessor of a mere favor or indulgence, revocable at the pleasure of the court or of the Legislature. The order of the court admitting him as an attorney clothes him with a right, which can be taken from him only by a judgment of the court, after an opportunity to be heard, for moral or professional delinquency. As a rule, only citizens, who have attained the age of 21 years, are admitted to the bar. In some States women are declared ineligible as attorneys at law; but the present tendency in this country is to hold them eligible. It is usual for State and Federal courts to admit to their bar, without an examination or formal certificate of character, persons who have practiced as attorneys of the highest courts of their respective States for three years or more.

Upon admission, the attorney is required to take an oath that he will demean himself, as an attorney and counselor of the court, uprightly and according to law, and that he will support the constitution of the State and of the United States. Toward his client, the attorney stands in a fiduciary position. The client confides in him, and he is bound not to betray this confidence, but to observe the utmost good faith in all matters connected with their relations. Moreover, he is bound to use reasonable care and skill in giving advice to his client, and in conducting legal proceedings in his behalf. He is entitled to reimbursement by his client for all proper expenditures on the latter's behalf, and to a fair compensation for his services, in the absence of a special agreement on that point. The better to secure him in this right, the law accords him a lien on the client's papers or property which come into his possession in his professional capacity.

While an attorney is bound to his client to act with all reasonable skill and zeal in advancing the latter's interests, he is also under a duty toward third persons to act lawfully. No amount of zeal in his client's behalf will justify him in engaging, knowingly, in an unlawful act, such, for example, as instituting a suit which he knows is malicious and without probable cause. In conducting a litigation, he may take a good deal of latitude; he may say much which is derogatory to the reputation of others: but, in this country, his remarks are not absolutely privileged; they must be pertinent to the subject-matter of the litigation. If they are not pertinent and are defamatory, he will be liable to an action for defamation (q.v.). Consult Weeks, *Treatise on Attorneys and Counselors at Law* (San Francisco, 1892).

Attorney-General. In England, the chief law officer of the crown, and, by reason of his office, the titular head of the bar. As the legal adviser of the Crown and of the various governmental departments, and as a cabinet minister, he possesses great authority and dignity. His salary is £7000 per annum, and he is not allowed to engage in private practice. The attorney-general of the United States is the chief law officer of the Federal Government and a member of the President's cabinet. His duties are prescribed by statute, and his annual salary is $8000. Each State has a similar officer, as has each Crown colony of Great Britain. *Attorney-General to the Prince of Wales* is the officer in whose name the Prince, as Duke of Cornwall, may sue and be sued in matters connected with that duchy.

Attorney, Letter or Power of. An instrument authorizing a person to act as the agent or attorney of the person granting it. A general power authorizes the agent to act generally for the principal. A special power limits the agency to particular things. A power of attorney may be by parole, or under seal. The attorney cannot execute a sealed instrument that will bind his principal unless his own power is given under seal. Grants of this nature are very strictly construed. Authority given to one person cannot be delegated by him to another, unless expressly set forth in the original grant. The death of the principal at once cancels a power of attorney. All conditions in the power must be strictly observed to render the attorney's action legal. Consult the works referred to under the title Agent.

Attorney, Warrant of. The written authority to an attorney at law to appear in a litigation for the maker. The production of such authority is rarely required by the courts. The term is applied also to the written authority given by a debtor to an attorney named by the creditor to confess judgment for the debt. It is often attached to and made part of a promissory note. In some States it renders the note non-negotiable: but in most jurisdictions it does not affect the negotiability of the note.

ATTORNMENT, ăt-tûrn′ment (for derivation, see Attorney). The formal recognition, by a tenant, of the grantee of the freehold as his landlord. This doctrine, which has played an important rôle in the modern law of landlord and tenant, had its almost forgotten origin in the feudal system of land tenure. The intimate character of the relationship of lord and freehold tenant in this system required not only that the lord should choose his own tenant, but the correlative right of the tenant to choose his own lord. The tenant was the first to gain the right to alienate his freehold, and thus to impose upon his lord a tenant, not of the latter's choice (Statute *Quia Emptores*, 18 Edw. I., a.d. 1290), but the right of the tenant to refuse his assent to the conveyance of the landlord's estate in the premises, and thus to render his grant ineffectual and incomplete, not only continued 400 years longer, but was extended by analogy to the common, non-feudal relations of landlord and tenant. Accordingly, it was the law of England and of the English colonies in America until the statute of 4 Anne, c. 16, a.d. 1705, that an owner of lands subject to a lease for life or years could not make an effectual grant of his reversion (q.v.), or estate as landlord, without the assent of the tenant in possession. This assent might be manifested by words, by agreement in writing, by the payment of rent or of a nominal sum, and was called an attornment, or turning to, submission to, the new landlord. Without such attornment the grantee of the reversion was not entitled to the rents and services of the tenancy, nor could he enforce against the tenant any covenant or condition on which the lands were held. The statute above referred to, however, dispensed with the necessity of attornment in all ordinary cases of conveyance of his estate by the landlord, making such conveyance good and effectual from its date, the tenant becoming *ipso facto* tenant of the grantee upon the terms of the existing lease, and such is now the law everywhere in the United States.

Under the old law it was possible for a tenant, by attorning to a stranger, virtually to dispossess, or disseize, his landlord, and thus put him to an action to recover possession of his lands. This extraordinary and wrongful effect of an attornment was also done away with by the statute of Anne (sec. 10), and the tenant estopped to deny his landlord's title (see Estoppel), unless the attornment be made with the landlord's consent, or in consequence of a judgment or decree of a court, or to a mortagee after the mortgage has been forfeited. The exceptions are still a part of the law, and, under them, the doctrine of attornment is an important part of the modern law of landlord and tenant. It should be added that, though a tenant is, in the ordinary case of an alienation of the freehold by his landlord, no longer protected by the necessity of making an attornment, he does not become liable on the obligations of his lease to the new landlord until notified of the transfer. Consult: Kent, *Commentaries on American Law* (Boston, 1896); Taylor, *Treatise on the American Law of Landlord and Tenant* (Boston, various editions). See Landlord and Tenant.

ATTRAC′TION (Lat. *attractio*, a drawing together, from *ad*, to + *trahere*, to draw). The phenomenon taking place when two or more bodies belonging to the same system, but separated from contact with one another, tend to approach each other as the result of a condition of stress. Attraction is seen in the case of celestial bodies, the earth and a falling body, electrified bodies, and a magnet and a piece of iron or steel. Gravitational attraction varies as the product of the masses, and inversely as the distance separating them, or, in other words, follows the 'Law of Inverse Squares.' Attraction is the same in nature as repulsion, but is opposite in direction, the former being considered to be a negative force, in that it tends to diminish the distance between the bodies, while the latter is considered positive, in that it tends to make this distance greater. It plays an important part in the discussion of many physical phenomena, and will be found treated at considerable length in the articles Gravitation; Electricity; and Magnetism.

AT′TRIBUTE (Lat. *attributum*, from *ad*, to + *tribuere*, to ascribe). (1) In painting and sculpture, a symbol associated with a figure to describe and emphasize its meaning in a religious, mythological, or allegorical subject. No period of art has been without attributes, but they have been most important at times when art has been less able to give character to the figures themselves, so that they can be recognized without the help of the accompanying attributes. The brush is the attribute of the painter; the stylus, of the scribe; the crown, of royalty; wings, of genii and angels. These are class attributes. In mythology the cow is the attribute of Hathor (Egypt); the tiger, of Ishtar (Assyria); the club, of Heracles; the trident, of Poseidon or Neptune (Græco-Roman). In Christian art, the gridiron is the attribute of Saint Lawrence; the lamb, of Saint Agnes; the keys, of Saint Peter. Attributes differ from emblems (q.v.) and symbols in having no value apart from their figures. (2) In logic, a mark or quality considered as giving character to an object of thought. (See Logic.) It is a term much used in Christian theology to denote some characteristic of the Divine nature, such as omniscience.

ATTRI′TION. See Contrition.

ATTU, ät′too͞, or **ATTOO.** One of the extreme western islands of the Aleutian Group, nearer the coast of Asia than that of America, latitude 52° 58′ N., longitude 172° 66′ E. (Map: Arctic Regions. A 4). Upon it is a small village, with less than 100 native families.

AT′TUCKS, Crispus. The first man killed in the 'Boston Massacre' (q.v.), March 5, 1770. He was a half-breed Indian, or a mulatto, of Framingham, Mass., born about 1720. By some he is said to have been a quiet on-looker; by others, a ringleader in the disturbance. A monument to him has been erected in Boston. Consult the *American Historical Record* for 1872.

AT′WATER, Wilbur Olin (1844—). An American chemist. He was born at Johnsburg, N. Y., and graduated at Wesleyan University, Middletown, Conn., in 1865, received his doctor's degree from Yale University in 1869, and afterwards studied physiological and agricultural chemistry at the universities of Leipzig and Berlin. He was professor of chemistry at East Tennessee University, at Maine State College, and at Wesleyan University. He was first director of the Connecticut Agricultural Experiment Station from 1875 to 1877, and of the Office of Experiment Stations, United States Department of Agriculture, from 1888 to 1891. Since 1887 he has been director of the Storrs (Conn.) Experiment Station, and since 1894 has had charge of nutrition investigations of the United States Department of Agriculture. In conjunction with Rosa, he invented the well-known respiration calorimeter for experiments on the metabolic changes going on in the human body. Dr. Atwater is the author of numerous articles on physiological and agricultural chemistry, published with Government and experiment station reports, and in various scientific and popular journals.

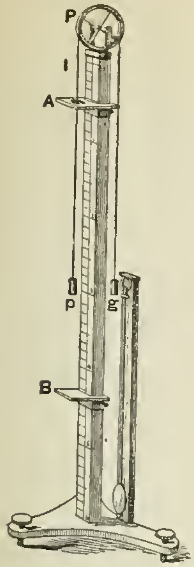
AT′WILL, Edward Robert (1840—). An American clergyman. He was born at Red Hook, N. Y.; graduated at Columbia College in 1862, and at the General Theological Seminary, in New York City, in 1864. He entered the ministry of the Protestant Episcopal Church, and after service in New York, Vermont, and Ohio, became Bishop of West Missouri in 1890.

AT′WOOD, Charles B. (1849-95). An American architect, noted principally as the designer of W. H. Vanderbilt's house on Fifth Avenue, New York, and as designer-in-chief of the World's Fair buildings in Chicago, where the Art Building and Peristyle Court were his work.

ATWOOD, George (1746-1807). An English mathematician and physicist. He was born in London, and graduated at Trinity College, Cambridge, with high honors in 1769. Subsequently he was appointed fellow and tutor. He received the degree of M.A. in 1772, and was elected a member of the Royal Society in 1776. Through the influence of William Pitt, he was appointed to a position in the customs service, where he performed a number of important mathematical calculations connected with the revenue. The apparatus known as Atwood's Machine (q.v.), which was designed to show the acceleration of gravity, was described in his *Treatise on the Rectilinear Motion and Rotation of Bodies, with a Description of Original Experiments Relative to the Subject* (1784). He also wrote *A Description of the Experiments Intended to Illustrate a Course of Lectures on the Principles of Natural Philosophy* (1776), and *An Analysis of a Course of Lectures on the Principles of Natural Philosophy* (1784), as well as a number of papers on mathematical subjects, published for the most part in the *Philosophical Transactions.* For one of these he received the Copley Medal in 1796.

ATWOOD, Isaac Morgan (1838—). A Universalist clergyman, born at Pembroke, N. Y. He became a Universalist minister in 1859, and was the president of the Canton (N. Y.) Theological School, and professor of theology from 1879 till 1899. Afterwards he became general superintendent of the denomination in United States and Canada. His publications embrace: *A Glance at the Religious Progress of the United States* (1874); *Walks About Zion* (1881); *Revelation* (1888); *Balance Sheet of Biblical Criticism* (1895). He edited *The Latest Word of Universalism* (1878).

ATWOOD'S MACHINE, mȧ-shēn′. An instrument for illustrating the relations of time, space, and velocity in the motion of a body falling under the action of gravity, invented by George Atwood (q.v.). It is known that a body falling freely passes through 16 feet in the first second, 64 feet in the first two seconds, 144 feet in the first three seconds, and so on. Now, as these spaces are so large, it would require a machine of impracticable size to illustrate the relations just mentioned. The object of Atwood's machine is to reduce the scale on which gravity acts without in any way altering its essential features as an accelerating force. The machine consists essentially of a pulley, *P* (see the cut), moving on its axis with very little friction, with a fine silk cord passing over it, sustaining two equal cylindrical weights, *p* and *q*, at its extremities. The pulley rests on a graduated wooden pillar, which is placed in a vertical position by leveling screws. Two stages, *A* and *B*, slide along the pillar, and can be fixed at any part of it by means of clamps. One of these stages, *A*, has a circular hole cut in it, so as to allow the cylinder, *p*, to pass freely through it; the other is unbroken, and intercepts the passage of the weight. A pendulum, chronograph, or other device is used with the machine to measure time. The weight of the cylinders, *p* and *g*, being equal, they have no tendency to rise or fall, but are reduced, as it were, to masses without weight. When a bar is placed on *p*, the motion that ensues is due only to the action of gravity upon it, so that the motion of the whole must be considerably slower than that of the bar falling freely. Suppose, for instance, that *p* and *g* are each 7½ ounces in weight, and that the bar is 1 ounce, the force acting on the system—leaving the friction and inertia of the pulley out of account—would be 1-16 of gravity, or the whole would move only 1 foot in the first second, instead of 16. If the bar be left free to fall, its weight or moving force would bring its own mass through 16 feet the first second; but when placed on *p*, this force is exerted not only on the mass of the bar, but on that of *p* and *g*, which is 15 times greater, so that it has altogether 16 times more matter in the second case to move than in the first, and must, in consequence, move it 16 times more slowly. By a proper adjustment of weights, the rate of motion may be made as small as we please, or we can reduce the accelerating force to any fraction of gravity. Suppose the weights to be so adjusted that under the moving force of the bar or circular weight the whole moves through 1 inch in the first second, we may make the following simple experiments: *Experiment* I.—Place the bar on *p*, and put the weight in such a position that the lower surface of the bar shall be horizontally in the same plane as the 0 point of the scale, and fix the stage A at 1 inch. When allowed to descend, the bar will accompany the weight, *p*, during 1 second and for 1 inch, when it will be arrested by the stage A, after which *p* and *g* will continue to move from the momentum they have acquired in passing through the first inch. Their velocity will now be found to be quite uniform, being 2 inches per second, illustrating the principle that a falling body acquires, at the end of the first second, a velocity per second equal to twice the space it has fallen through. *Experiment* II.—Take, instead of the bar, the circular weight, place the bottom of *p* in a line with the 0 point, and put the stage B at 64 inches. Since the weight accompanies *p* throughout its fall, we have in this experiment the same conditions as in the ordinary fall of a body. When released, the bottom of the cylinder, *p*, reaches 1 inch in 1 second, 4 inches in 2 seconds, 9 inches in 3 seconds, 16 inches in 4 seconds, 25 inches in 5 seconds, 49 inches in 7 seconds, and 64 inches and the stage in 8 seconds—showing that the spaces described are as the squares of the times. *Experiment III.*—If the bar be placed as in Experiment I., and the stage A be fixed at 4 inches, the bar will accompany the weight, *p*, during 2 seconds, and the velocity acquired in that time by *p* and *g* will be 4 inches per second, or twice what it was before. In the same manner, if the stage A be placed at 9, 16, 25, etc. inches, the velocities acquired in falling through these spaces would be respectively 6, 8, 10, etc. inches—2 inches of velocity being acquired in each second of the fall. From this it is manifest that the force under which bodies fall is a uniformly accelerating force—that is, adds equal increments of velocity in equal times. By means of the bar and the stage A, we are thus enabled to remove the accelerating force from the falling body at any point of its fall, and then determine the velocity it has acquired.



Atwood's machine will be found described and explained in almost any treatise on physics, and complete directions for performing the experiments are given in Glazebrook and Shaw's *Practical Physics* (New York, 1893).

A'TYS. See ATTIS.

AUBANEL, ō'bȧ'nĕl', THÉODORE (1829-86). A French author. He was the son of a printer of Avignon, and while following his father's profession, sought, throughout a period of thirty years, to bring about a regeneration of the language and literature of the troubadours of Provence, to which end he long collaborated with Mistral, Roumanille, and other *félibres*. He was called by some of his more enthusiastic admirers, 'the Petrarch of France.' He is best known by his poems *La Miôugrano entreduberto* (Paris, 1860). A drama of his in five acts, entitled *Lou pan dòu pecat*, was performed with great success at Montpellier in 1878.

AUBE, ōb. A central department of France, occupying the southern part of the old Province of Champagne, and a small portion of Burgundy (Map: France, L 3). The eastern part belongs to the basin of the Aube; the western to the basin of the Seine. Area, 2317 square miles. Population, in 1896, 250,907; in 1901, 245,596. The climate is mild, moist, and changeable, but on the whole healthful. A great portion of the area is arable land, producing grain, hemp, hay, and wine. There are some deposits of limestone, marl, and potters' clay. Capital, Troyes.

AUBE. A tributary of the Upper Seine (Map: France, L 3). It rises on the plateau of Langres, in the Department of Haute-Marne, and falls into the Seine at Pont-sur-Seine, after a course of 150 miles, for a small part of which it is navigable. It is used for the transportation of coal, lumber, and grain.

AUBE, HYACINTHE LAURENT THÉOPHILE (1826-90). A French admiral. He was born at Toulon; entered the navy in 1840; served with distinction in the colonies, and was in charge of some coast defenses during the Franco-German war. In 1879 he was appointed governor of Martinique, and on his return to France in 1881 was made a rear-admiral. His appointment to the ministry of the navy and to the rank of vice-admiral followed in 1886. Aube was a strong advocate of the torpedo system. He was a voluminous writer, some of his more important works being: *De la marine française* (1873); *La guerre navale et les ports militaires de la France* (1879); *Italie et Levant* (1884); *Marine et colonies* (1885). Most of his writings have been collected under the titles: *Entre deux campagnes* and *A terre et à bord.*

AUBE, Jean Paul (1837—). A French sculptor. He was born at Longwy (Meurthe-et-Moselle), and was educated at the Ecole des Beaux-Arts. Among the numerous statues and other works executed by him are the following: "Dante Alighieri" (1880), at Paris; "Général Joubert à Rivoli," at Bourges; "Gambetta," at Paris.

AUBER, ō'bâr', Daniel François Esprit (1782-1871). A famous French operatic composer. He was born at Caen, Normandy, and died in Paris. His father, an amateur painter and violinist of some note, was a dealer in prints, and sent him to England to learn the trade. But his love for music soon asserted itself, and in 1804 he returned to Paris, where his musical compositions soon attracted attention. His concertos for the 'cello and violin were performed with great success by Lamare and Mazas respectively. In 1811, a resetting of an old libretto, *Julie,* to the accompaniment of six stringed-instruments, won the admiration of Cherubini at a performance by amateurs. Cherubini then gave Auber instruction in composition, and a part of a mass written about this time is preserved as the prayer in *La muette de Portici.* Auber's one-act opera, *Le séjour militaire* (1813), was a dismal failure, and the discouraged composer did not again tempt fortune until his father's death left him without means of livelihood. His next work, *Le testament et les billets-doux* (1819), was not successful, but *La bergère châtelaine* (1820), a comic opera in the Rossinian style, was enthusiastically received, and the composer's fame increased with subsequent works, which followed in rapid succession (over forty in all) until his very death. *Le maçon* was produced at the Paris Opéra Comique (1825) and is one of the stock pieces of the German opera-houses today. *La muette de Portici* (or *Masaniello,* also *Fénella*), 1828, is his most serious opera. The author of sparkling music of the light order here sounded broader and deeper emotions and produced strongly dramatic contrasts. *Fra Diavolo* was performed in 1830, and has remained his most popular work. Other operas still retained in the modern répertoire are: *Le philtre* (1831); *Le cheval de bronze* (1835); *Le domino noir* (1837); *Le lac des fées* (1839), and *Les diamants de la couronne* (1841). He was chosen to succeed Gossec at the Academy in 1829, became director of the Conservatoire in 1842, and was appointed court chapel master by Napoleon III. in 1857. Auber is deemed the founder of what the French call *grand opéra;* Rossini's *Guillaume Tell* (1829), Halévy's *La juive* (1835), and Meyerbeer's *Robert le diable* (1831) and *Les Huguenots* (1836) show the influence spread by *La muette de Portici.* The formal structure, the musical individualization of conflicting ethnographical or religious elements, the stirring mass-effects, the local color in the orchestra brought to a high state of perfection, and the pageantry of these works, are all derived from Auber. In *opéra comique,* too, Auber occupies a prominent place. For external polish, captivating melody, brilliant orchestration, dash and Parisian chic, his music remains unexcelled. Consult G. T. Ferris, *Great Musical Composers* (New York, 1887).

AUBERGE ROUGE, L', lō'bârzh'rōōzh ('The Red Inn'). A striking psychical romance by Balzac (1837), based on the psychic suggestion of a murder, for which the suggester is executed while the actual murderer enjoys the fruits of the crime. The story involves the questions of comparative guilt and innocence, atonement, and the proper use of the wealth gained by the wrongdoing.

AUBERLEN, ou'bẽr-len, Karl August (1824-64). A German theologian. He was born at Fellbach, near Stuttgart, studied at Tübingen, and became professor of theology at Basel in 1851. As a youth he was influenced by Baur, but later he adopted the conservative views of Beck and Rothe. He is still remembered by his *Prophecies of Daniel and the Revelation of Saint John, viewed in their Mutual Relation; with an exposition of the principal passages* (Basel, 1854; 2d ed. 1857; Eng. trans. Edinburgh, 1856); *The Divine Revelation, an essay in defense of the faith* (Basel, 1862-64, 2 vols.; Eng. trans. of Vol. I., 1867); *The Old Testament Dispensation and the Heathen World; The Resurrection and Ascension of Jesus Christ* [lectures], in the volume entitled in English *Foundations of Our Faith* (1882; Eng. trans., 1863; 2d ed., 1868), and his commentary on Thessalonians in Lange (Bielefeld, 1864; Eng. trans., 1868). The English translation of the *Divine Revelation* contains a brief memoir.

AUBERT, ō'bâr', Jean Louis (1731-1814). A French author. He was born at Paris, and first attracted attention by his *Fables,* which were published in the *Mercure de France* and favorably regarded by Voltaire. He was professor of French literature at the Collège Royal from 1773 to 1784, and from 1774 to 1786 editor of the *Gazette de France.* He was one of the leading journalists of his time. His works were collected as *Fables et œuvres diverses* (1774).

AUBERVILLIERS, ō'bâr'vē'yâ'. One of the northern suburbs of Paris (Map: Paris and vicinity). There are manufactures of chemical products, glass, rubber, perfumes, and beer. Population, in 1896, 27,000.

AUBIGNAC, ō'bē'nyȧk', François, Abbé d' (1604-76). A French dramatist and critic, born in Paris. His real name was Hédelin, but he is better known as the Abbé d'Aubignac, from the abbey conferred on him by Richelieu. He was chosen by Richelieu to be the tutor of his nephew, but is described as having been excessively pedantic and conceited. Chief among his compositions are a prose tragedy, called *Zénobie,* and a tedious work on the *Pratique du théâtre,* based on Aristotle. He was one of the first to raise the modern question in regard to the authorship of the Homeric poems.

AUBIGNÉ, ō'bē'nyā', Théodore Agrippa d' (c.1550-1630). A French Huguenot soldier, militant poet, historian, and statesman. He was born near the town of Pons in Saintonge. As a child he was a brilliant classical scholar. He early embraced the Huguenot cause, was captured, condemned to death, escaped, and in 1564 was present at the siege of Orleans, where his father was killed. His guardian sent him to Geneva to escape persecution. He studied under Beza, but in 1567 enlisted under Condé, and later served Henry of Navarre as soldier, and sometimes over-candid counselor. After Henry's assassination Aubigné fell into disfavor, and in 1620 sought refuge at Geneva, whence he superintended the fortifications of Bern and Basel. In spite of his storm-tossed life, he had found time to produce much of value to literature and to contemporary history. His *Histoire universelle, 1550-1601*, published at Amsterdam (1616-20), was officially burned in France, as was also his autobiographical *Histoire secrète*, on its appearance in 1721. These are very valuable, but bitterly satirical, as is his controversial *Confession catholique du Sieur de Sancy* and *Les aventures du baron de Fæneste* (1617), one of the earliest realistic novels of the Seventeenth Century. His greatest work, begun while recovering from a wound (1577), is a group of satirical poems, *Les tragiques* (1616), which are sombre and unexcelled descriptions of the horrors of religious warfare. They are divided into "The Miseries," "The Princes," "The Gilded Chamber" (i.e. the courts), "The Fires," "The Swords," "The Vengeances," and "The Judgment," where the Huguenot, oppressed on earth, cites his persecutor before the bar of God at the Resurrection. The 9000 verses are a strange mingling of beauty and chaos, often reckless, sometimes obscure, but with passages of a fierce inspiration, a brilliant imaginative enthusiasm, that have earned deserved immortality, both for their own sake, as the noble utterance of an offended conscience, and as a true expression of the faith, courage, restless searching of spirit, presumption, and pride, that characterized the movement in which he bore a brave part. He is a striking figure, writing with the style of Rabelais and the spirit of Henri Estienne (see STEPHANUS) in the days of Malherbe and Richelieu, without elegance, clearness, precision, or composition, but with the energy born of the Renaissance and the Reformation. An almost universal scholar in the learning of his time, Aubigné was never a pedant. For that he was too sincere, intense, earnest; and, even in bitterness, he strove to be just. Thus his *History* presents the mind of his epoch, even when it distorts its facts. His complete *Works* have been edited by Réaume and Caussade (6 vols., 1873-93), the *Tragiques* by Lalanne (1857) and Reade (1872); *Histoire universelle*, by Ruble (1886-97). Consult: Morillot, *Discours sur la vie et les œuvres d'Agrippa d'Aubigné* (Paris, 1885); Salis, *Agrippa d'Aubigné* (Heidelberg, 1885), and a *Life* in French by G. Guizot, *Agrippa d'Aubigné* (Paris, 1890); also Körting, *Geschichte des französischen Romans im XVII. Jahrhundert* (Oppeln, 1891).

AUBIGNÉ, MERLE D'. See MERLE D'AUBIGNÉ.

AUBIN, ô'băN'. A town of France in the Department of Aveyron, on the Orleans Railway (Map: France, J 7). There are extensive coal mines in the vicinity, as well as iron and other mines. The town contains an old church, dating from the Twelfth Century, and a ruined castle. Population (1896) of commune, 9781.

AUBREY, ạ'brĭ, JOHN (1626-97). An English antiquary. He was a diligent collector of old documents, and left some valuable works of his own. He published only one book, called *Miscellanies* (1696), but several of his works were afterwards edited and published by others. Among these were *Natural History and Antiquities of Surrey* (1719), and *Letters written by Eminent Persons of the Seventeenth and Eighteenth Centuries* (1813). The latter gives much biographical matter concerning English poets. See his biography, by J. Britton (London, 1845), and the essay of Professor Masson in *The British Quarterly Review*, Vol. XXIV. (London, 1857).

AUBRIOT, ô'brê'ô', HUGUES (died 1382). A mayor of Paris. He was born at Dijon; was appointed treasurer under Charles V. and afterwards became mayor and governor of Paris (1364), in which capacity he organized several of the greatest public works of the city. He laid the corner-stone of the Bastile, built Le Petit Châtelet, the Pont Saint Michel, and several quays along the Seine, and completed the fortifications begun by Etienne Marcel. After the death of Charles V. he was accused of heresy and sentenced to perpetual captivity in the Bastile, but was liberated by the Mailletons soon afterwards. His statue adorns the façade of the Hôtel de Ville in Paris.

AUBRY, ô'brê', CHARLES MARIE BARBE ANTOINE (1803-83). A French jurist, born at Zabern, Alsace. He was professor and assistant judge of the tribunal at Strassburg in 1870, and councilor of the Court of Cassation in Paris from 1872 to 1878. He became a commander of the Legion of Honor in 1878. He was one of the best French writers on jurisprudence, and was widely known also by his articles on legislation and a translation of Goethe's *Faust*. His principal work is the *Cours de droit civil français, d'après la méthode de Lacharial* (8 vols., Paris, 1869-76).

AUBRY DE MONTDIDIER, ô'brê' de môN'dê'dyâ'. A French knight who lived during the reign of Charles V., and, according to tradition, was assassinated in the forest of Bondy by his comrade, Richard de Macaire, in 1371. The latter was suspected of the crime because the dog belonging to the deceased Aubry invariably displayed toward him the most unappeasable enmity. Macaire was, therefore, required by the King to fight with the animal in a judicial combat, which was fatal to the murderer. This tale was afterwards, under the titles of "Aubry's Dog," "The Wood of Bondy," "The Dog of Montargis," frequently acted, the dog always gaining the greatest share of applause. It was called *The Dog of Montargis*, because Charles VIII. had the fight between the dog and Macaire depicted over a mantel in his château of Montargis. As late as 1816 a melodrama based on the legend found great favor on the European stage. After being performed with success at Vienna and Berlin, it was to be played at the Weimar theatre of which Goethe was the manager; but the poet resigned his office before the dog made his début.

AUBURN, ạ'bûrn. A village in Lee County, Ala., about 50 miles east by north of Montgomery, the State capital; on the Western Railway of Alabama (Map: Alabama, D 3). It is the seat of the Alabama Polytechnic Institute, opened in 1872. Population, in 1890, 1440; in 1900, 1447.

AUBURN. A city and the county-seat of De Kalb County, Ind., 22 miles north by east of Fort Wayne; on Cedar Creek, and on the Vandalia, the Lake Shore and Michigan Southern, and the Baltimore and Ohio railroads (Map: Indiana, D 1). It carries on a trade in grain, live stock, hay,, etc.; and manufactures furniture, carriages and wagons, hoops, staves, spokes, lumber, gas-engines, windmills, stoves, etc. The county buildings are the principal features of interest. There are municipal water-works and an electric-light plant. Population, in 1890, 2415; in 1900, 3396.

AUBURN. A city and the county-seat of Placer County, Cal., about 35 miles northeast of Sacramento, on the Southern Pacific Railroad (Map: California, C 2). It contains a library, and is the seat of the county high school. Gold and limestone are found in the adjacent region; mining, fruit-growing, and general agriculture are the leading industries. Auburn was first settled in 1848. Population, in 1890, 1595; in 1900, 2050.

AUBURN. A city, and the county-seat of Androscoggin County, Maine, 34 miles north of Portland, on the Maine Central and Grand Trunk railroads (Map: Maine, C 7). It has extensive manufactures of cotton goods and boots and shoes, abundant water-power being supplied by the Androscoggin and Little Androscoggin rivers. The city has a public library, and owns and operates its water-works. In the vicinity are many points of scenic interest, notably Lewiston Falls, Lake Auburn, and Poland Springs. Auburn was settled 1786, and first incorporated 1842. The charter, in operation since 1869, provides for a mayor, elected annually, and a bicameral city council, which controls all important appointive offices. Population, in 1890, 11,250; in 1900, 12,951.

AUBURN. A city, and the county-seat of Nemaha County, Neb., 65 miles south of Omaha, on the Little Nemaha River, and on the Missouri Pacific and the Burlington and Missouri River railroads (Map: Nebraska, J 3). Population, in 1890, 1537; in 1900, 2664.

AUBURN. A city, and the county-seat of Cayuga County, N. Y., 25 miles southwest of Syracuse, on the outlet of Owasco Lake, and on the New York Central and Lehigh Valley railroads (Map: New York, D 3). It has good water-power, and extensive manufactures of agricultural implements, cotton and woolen goods, carpets, iron, etc. The city has many fine public and private buildings, and a bronze statue of William H. Seward, whose home was here. It is also the seat of the Auburn Theological Seminary (Presbyterian) (q.v.), established in 1820; of a State insane asylum, and a State prison—a large stone structure which provides for 1200 convicts. Auburn is governed, under a charter of 1879, by a mayor, elected biennially, and a city council. The mayor has power of appointment of heads of important departments—street, charities, fire, police, and health; the council, elective power in minor offices. The annual expenditures of the city exceed $300,000, the main items being: $18,000 for the police department, $21,000 for the fire department, and $82,000 for schools. The water-works are owned and operated by the municipality. Founded by Capt. John L. Hardenburgh in 1792, and called Hardenburgh's Corners until 1805, Auburn was made the county-seat, and received its present name (from the village in Goldsmith's poem) in that year, was incorporated as a village in 1815, and was chartered as a city in 1848. Population, in 1880, 25,858; in 1900, 30,345. Consult H. Hall, *The History of Auburn* (Auburn, 1869).

AUBURN. The name of the place celebrated in Goldsmith's *Deserted Village*, and commonly identified with Lissoy, County Westmeath, Ireland. Here the poet's father had a parish, and here the poet spent his boyhood.

AUBURN THE'OLOG'ICAL SEM'INARY. An American Presbyterian seminary, situated at Auburn, N. Y. It was founded in 1819 and opened in 1821. In 1901 the endowment was $650,000, and an effort was being made to raise this amount to $1,000,000. The productive funds amounted to nearly $600,000, and the annual income to nearly $80,000. The library contains 27,140 volumes and 8200 pamphlets. The course is three years, and is designed primarily for college graduates. In 1901 the faculty numbered 10, and the students 72. President, Rev. George B. Stewart, D.D.

AUBUSSON, ô'bụ'sôɴ', PIERRE D' (1423-1503). Grand Master of the Order of Saint John of Jerusalem. He was born of a noble French family. At the age of twelve or thirteen he distinguished himself, under Albert, Duke of Austria, in fighting against the Turks in Hungary. In 1444 he took part in the campaign of the Armagnacs against the Swiss. Disgusted at the disgraceful failure of this expedition, due to the heroism of the Confederates at 'the German Thermopylæ,' he went to Rhodes and entered the Order of Saint John. He distinguished himself in fighting pirates and on diplomatic missions. In 1476 he was elected Grand Master. In 1480 he defended Rhodes successfully against Mohammed II. He was a very able diplomat, and enriched and strengthened his order. In 1488 he was made a cardinal. He has been called 'the shield of the Church,' because his great aim was to form a league of Christians against the infidels. In 1501 he seemed on the point of accomplishing his purpose, and was appointed commander-in-chief of the forces to be furnished by the Pope, the Emperor of Spain, and the kings of Castile, Portugal, Hungary, and France. But the alliance had no effect on account of the jealousies of the participants. Aubusson died in 1503. Consult Streck, *Pierre d'Aubusson* (Chemnitz, 1872).

AUCASSIN ET NICOLETTE, ô'kȧ'săɴ' ȧ nê'kô'lĕt'. A naïve romance in Old French, celebrating the love and adventures of the young couple whose names form the title. Even by the casual reader of the present day, the story will be found to possess a singular charm. The author never forgets that he has a tale to tell, and the human interest always predominates. For its time, the narrative is remarkably direct, and its artlessness has all the virtue of consummate art.

AUCH, ôsh. The capital of the Department of Gers, in the south of France, situated on a hill near the River Gers, 42 miles west of Toulouse (Map: France, G 8). Auch is the seat of an archbishop, and possesses a museum of natural science and a library. Its highest point is crowned by the cathedral structure, famous for its stained windows. It was begun by Charles VIII. and completed by Louis XIV. It has an active trade in woolen and cotton goods, fruits, wine and brandy. Population, in 1896, 9300. In ancient times it was called Elimberrum; at a somewhat later period it took its name from the Ausci, whose chief town it was. In the Eighth Century it became the capital of Gascony.

AUCHENIA, ạ-kē′nĭ-ȧ, **AUCHENIDÆ,** ạ-kĕn′ĭ-dē. See LAMA.

AUCHMUTY, ŏk′mū-tĭ, SAMUEL (1722-77). An American clergyman. He was born in Boston, graduated at Harvard (1742), and studied theology in England. He became assistant rector of Trinity Parish, New York City, in 1763, and rector, with full charge of all the Episcopal churches in the city, in 1764. An ardent Royalist, he persisted in reading prayers for the King after the occupation of the city by Continental troops, and when forced to desist, locked the churches, left the city, and remained away until the British had gained possession in September, 1776. He died from exposure endured in passing the American lines.

AUCHMUTY, Sir SAMUEL (1756-1822). A British general, son of Rev. Dr. Samuel Auchmuty. He graduated at King's (Columbia) College in 1775, and entered the British Army the next year. He was in the battles of Brooklyn and White Plains, and served in three campaigns. He served in India (from 1783 to 1796), in Egypt (1800), and in South America, where, in February, 1807, he took by assault the fort and city of Montevideo, for which Parliament voted him thanks. He was advanced to the rank of major-general in 1808, and two years afterwards was appointed commander-in-chief at Madras. The next year he reduced the Java Settlements, and was again voted thanks. In 1833 he was made a lieutenant-general, and was for a time commander-in-chief in Ireland, where he died.

AUCHTERARDER, ouḳ′tẽr-är′dẽr. A village in Perthshire, Scotland, about 15 miles southwest of Perth (Map: Scotland, E 3). Population (police burgh) in 1901, 2276, chiefly employed in cotton-weaving. The village was involved in the events leading to the disruption of the Church of Scotland and the formation of the Free Church, in 1843. Consult *The Auchterarder Case* (Edinburgh, 1842).

AUCKLAND, ạk′land. The northern provincial district of New Zealand (q.v.).

AUCKLAND. The capital of the Province of Auckland, on the North Island of New Zealand, and an important seaport, picturesquely situated on a peninsula projecting into the Hauraki Gulf, in latitude 36° 50′ S., and longitude 174° 50′ E. (Map: New Zealand, E 2). In addition to its splendid harbor at Waitemata, it possesses a second at Manukau, 6 miles distant, both well equipped with graving docks, wharves, and accommodation for the largest vessels. Auckland is distant 1315 miles from Sydney, 1650 from Melbourne, and 5440 from San Francisco, with which cities it has periodical steam communication. Its chief industries comprise ship-building, sawmills, rope-making, sugar refineries, glass-works, boot factories. It is connected by rail with the principal places throughout the island. Auckland contains some fine public buildings, government house, custom house, post-office, barracks, churches, a university college, two public libraries, parks, and a botanical garden. It is the see of an Episcopal bishopric and cathedral establishment. The United States is represented by a consul. It has a favorable climate, with an annual mean temperature of 59.3° F.; January 66.6°, July 51.9°. Founded in 1840, it became a burgh in 1851, and was the capital of New Zealand until 1865, when the seat of government was transferred to Wellington, as being more central. Population, in 1891, 28,773; in 1901, 34,216.

AUCKLAND, GEORGE EDEN, Earl of (1784-1849). An English statesman, son of William Eden, Baron Auckland. He was educated at Christ Church, Oxford, and Lincoln's Inn. On the death of his elder brother in 1810, he entered Parliament. He was President of the Board of Trade from 1830 to 1834, and First Lord of the Admiralty in 1834 and 1835. In the latter year he was appointed Governor-General of India. He was created Earl of Auckland in 1839, because of his part in the successful Afghan expedition.

AUCKLAND, WILLIAM EDEN, Baron (1744-1814). An English diplomat. He was educated at Oxford, and called to the bar in 1768. In 1772 he was appointed Under Secretary of State, and afterwards filled the posts of a lord of trade, a commissioner to treat with the insurgent colonies of North America (1778), and Chief Secretary to the Lord-Lieutenant of Ireland. Pitt sent him as a special commissioner to France to conclude a commercial treaty with that country (1786). Afterwards he served as plenipotentiary in Spain, ambassador to Holland and postmaster-general. In 1793 he was enrolled in the British peerage. He was the author of the *Principles of Penal Law* (1772); *Remarks on the Apparent Circumstances of the War* (1795); and several pamphlets. See *The Journals and Correspondence of William, Lord Auckland*, edited by his son, the Bishop of Bath and Wells, 4 vols. (1860-62).

AUCKLAND IS′LANDS. A group of islands to the south of New Zealand, in latitude 50° 3′ S. (Map: World, Western Hemisphere, P 2). It consists of the large island of Auckland (330 square miles), and a few smaller ones. They were discovered in 1806, and settled by the British in 1849; but are uninhabited at present. The New Zealand Government maintains a station on Auckland Island for the relief of shipwrecked sailors.

AUC′TION (Lat. *auctio*, increase, public sale by increased bids, from *augere*, increase). A public sale of property to the highest bidder. Ordinarily, the property offered for sale is described, and the conditions in accordance with which it will be sold are announced, before bids are invited. Each bid is an offer, the auctioneer's acceptance of which is indicated by his knocking down the property to the bidder. Until the bid is thus accepted it may be withdrawn; but when thus accepted a contract is formed between the seller and the buyer, containing as a part of its terms all statements and conditions publicly made to the bidders on the seller's behalf. An auction should be fairly conducted on both sides. There should be no puffing, or bidding by dummies, in the interest of the seller, nor should he be allowed to bid unless he has stipulated for that right in the conditions of the auction, or the right is accorded to him by statute, or by an order of court having control of the sale. On the other hand, any concerted action by bidders for stifling the sale is illegal, and may warrant the auctioneer in refusing to accept bids; it may even entitle the seller to avoid a sale.

The conduct of auctions is regulated, with a good deal of care, by modern statutes, in England and in many of our States. Not infrequently sham auctions are declared to be criminal offenses. As a rule, an auctioneer must have a license, either from the State or the municipal authorities. While engaged in bringing the property to a sale, he is the agent of the seller only. His power to bind the principal, and the principal's authority over him, as well as their respective duties to each other, are determined by the general principles of agency. As soon as the sale is made, he becomes an agent of the purchaser, as well as of the seller, for the purpose of making a memorandum of the sale which will satisfy the statute of frauds. This agency does not continue, however, beyond a reasonable time for the performance of that duty. The auctioneer has a lien on his principal's goods in his possession, and on the proceeds from their sale, to the extent of his commissions and expenses. Because of this interest in the property, he may sue in his own name for the purchase price, or for the wrongful conversion of the property by a third person. If he sells without disclosing his principal, he may be sued by the purchaser for any breach of the contract. Even though he names his principal, he will not always escape liability, though he follows strictly the principal's directions. If, for example, he in good faith sells property as that of the principal and turns the proceeds over to the latter, he will be liable for a conversion to a third party who owned and was entitled to possession of the property.

In a 'Dutch auction,' the property is offered at a high price, which the auctioneer lowers gradually, until a price is named which is accepted by the bidder. Here the offer is by the auctioneer and the acceptance by the bidder. An auction sale 'by inch of candle' is when the biddings are to be kept open only while a stipulated length of candle burns. These two forms of auction are practically obsolete in England and the United States. See Bateman, *Treatise on the Law of Auctions* (first American edition, Boston, 1883); seventh English edition, London, 1895); also the works referred to under AGENT.

AUCTIONEER. See AUCTION.

AUCUBA, ạ'kû-bȧ (Jap. *aoi*, *aoka*, green + *ba*, leaf). A genus of plants of the natural order Cornaceæ. The only known species is *Aucuba Japonica*, an evergreen shrub resembling a laurel. The leaves, however, are pale green, curiously mottled with yellow. It is diœcious, produces its small purple flowers in summer, and ripens its bright scarlet berries in March. It is a native of China and Japan, and is grown in Europe and America as an ornamental shrub. It is propagated by cuttings of half-ripened wood or by seed. A number of varieties, mostly with variegated leaves, are in cultivation. The plant is tolerant of smoke and dust.

AUDÆ'US, AUDIUS (or, according to his native Syriac name, UDO). The founder of an anthropomorphic religious sect in Mesopotamia, called the Audians, which flourished during the Fourth and Fifth centuries. He commenced by accusing the regular clergy of worldliness, impure morals, etc., and is said to have opposed to their manner of life a strict asceticism, until his conduct seemed dangerous to the welfare of the Church, when he was excommunicated. His disciples, who were very numerous, now clung more closely to him, and he was elected their bishop. In A.D. 338 he was banished to Scythia, where he instituted a kind of rival church, and where he died about A.D. 370. He is said to have held that the language of the Old Testament—e.g. Gen. i. 27, literally interpreted—justifies the belief that God has a sensible form.

AUDE, ōd. A southeastern maritime department of France (Map: France, J 8). It comprises a portion of the old Province of Languedoc. Area, 2438 square miles. Population, in 1896, 308,718; in 1901, 311,386. The southern part of Aude is mountainous, but the greater portion of it belongs to the valley of the lower Aude and the canal of Languedoc. The climate is warm but variable. The mountains are composed of granite, while the soil of the plains is chiefly calcareous, and about the coast—where salt and soda are procured—is extremely fertile, producing cereals, olives, fruits, and wines. Aude is rich in iron and coal, and has mineral springs. Capital, Carcassonne.

AUDE (anciently, Lat. *Atax*). A river in the south of France, rising in the East Pyrenees, in the Department of Pyrénées-Orientales (Map: France, K 8). It flows north as far as Carcassonne, where it turns east, and enters the Mediterranean near Narbonne. It is about 130 miles long.

AUDEBERT, ōd'bâr', JEAN BAPTISTE (1759-1800). A French naturalist and painter, born in Rochefort. In Paris he soon won success as a miniature painter. His love of natural history and his skill in painting birds and animals secured him employment in this field. For the purpose of making sketches he visited Holland and England in 1800. That year he produced his *Histoire naturelle des singes* (Natural History of Monkeys), a large folio, with 63 colored plates, remarkable for their truth and beauty. After his death two more volumes appeared, which were even more excellent than the first. They were his books on humming-birds (1802), and on woodpeckers and birds of paradise (1803).

AUDHUMLA, ou-DHōōm'lȧ. According to the myths of the Scandinavian cosmogony, the name of the cow upon whose milk the giant Ymir subsisted. She licked the frost of the icy abyss, Ginnungagap, and forth sprang Buri, the progenitor of Odin.

AUDIFFRET-PASQUIER, ō'dē'frȧ'pȧs'kyȧ', EDME ARMAND GASTON, Duc d' (1823—). A French statesman, born in Paris. In 1862 he inherited the title of Duc de Pasquier from a granduncle. During the reign of Napoleon III.

he was identified with the Orleanist opposition, and under the presidency of Thiers was one of the Moderate Conservative Party. In 1875 he was chosen president of the National Assembly, which he had entered in 1871, and though he had been an avowed supporter of the Bourbon restoration, he then accepted the Republic. He was the first life-Senator elected by the Assembly (1875); was president of the Senate from 1876-79, and in 1878 was chosen to the French Academy.

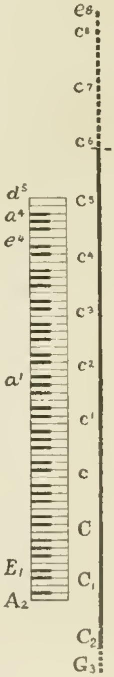
AU′DIOM′ETER (hybrid form, from Lat. *audire*, to hear + Gk. *μέτρον*, *metron*, measure). An instrument for the measurement of hearing, invented by Prof. D. E. Hughes, of London, in 1879. It consists of a battery, a microphonic key, two primary coils mounted at the extremities of a graduated bar, a secondary or induction-coil which moves along the graduated bar, and a telephone, the terminals of which are connected with the terminals of the induction-coil. The battery is connected with the microphonic key and the two primary coils, and the telephone is held at the ear of the person whose hearing is being tested. The amount of sound can be gradually increased by moving the induction-coil from the centre toward the larger of the two primary coils, and diminished by moving it toward the centre, the position at which it disappears being noted.

AU′DIPHONE (hybrid form, from Lat. *audire*, to hear + Gk. *φωνή*, *phōnē*, sound). An instrument to assist the hearing of persons whose auditory nerve has not been entirely destroyed. It consists of a thin sheet of ebonite rubber, hard vulcanite, or even glazed millboard or birchwood veneer, fan-shaped, and having strings leading from the outer edge to the base of the handle, so that it may be brought to different degrees of convexity. When the outer edge is pressed against the upper front teeth and the convex side is outward, sound vibrations are conveyed to the auditory nerve through the teeth and bones of the head.

AUDI′TA QUERE′LA (Lat. the complaint having been heard, from *audire*, to hear, and *querela*, complaint). A form of action which lies for a defendant against whom judgment has been rendered (and who is, therefore, in danger of an execution), to restrain or prevent the execution, on account of some matter occurring after judgment, amounting to a discharge, as payment or release of the debt for which judgment was given. Blackstone describes it as an action of a high remedial character, in the nature of a bill in equity to be relieved against the oppression of the plaintiff, invented to protect a party who has a good defense, but is too late to make it in the ordinary forms of law (Comm. iii. 406). The modern practice of the courts in granting summary relief upon motion, in cases of such oppression, has generally superseded this form of remedy, but it may still be employed in many States of the United States where complete justice cannot be done in this summary manner. See EXECUTION; JUDGMENT; SUPERSEDEAS; also ARREST OF JUDGMENT.

AUDITION, ạ-dĭsh′ŭn. **AU′DITORY SENSA′TION** (Lat. *audire*, to hear). Our sensations of hearing fall into two great groups, as sensations of tone and sensations of noise. The former are musical, smooth; the latter, abrupt, rough, and harsh. The physical stimulus of auditory sensation is the vibration of some material body that is transmitted to the ear under ordinary conditions by a wave-movement of the air particles, a to-and-fro motion in the direction in which the sound travels (longitudinal vibration). If the wave-movement be that of a simple sinusoidal curve (pendular vibration), the resulting sensation is a simple tone. If the wave-movement be cut short at a very early stage of its progress, or if the air be disturbed by a mere shock or concussion, we have the sensation of simple noise. The tone of a tuning-fork, standing upon its resonance-box, is practically a simple tone; the pop of a soap-bubble is an instance of a simple noise. The musical tones of ordinary experience are doubly complicated; they consist of a number of simple tones, sounding together, and are further accompanied by complex noises. The tone emitted by a violin-string, e.g. contains a half dozen different simple tones, which may be discriminated under proper conditions (see CLANG-TINT), as well as the scraping noise that arises from the drawing of the bow across the string. The noises of everyday life (crash, thump, clatter) are similarly complicated; they consist of a number of simple noises, among which a tonal element may often be distinguished.

The series of simple tonal qualities forms what is technically termed a continuous one-dimensional manifold; i.e. tones may be arranged along a single line, or scale, within which every term is separated by insensible gradations from the terms next preceding and following. Music (q.v.) employs less than 100 discrete tones, lying between the *e* of 41¼ and the *d* of 4752 vibrations in the 1 sec. The range of hearing is much wider, extending, under favorable circumstances, from the *g* of 12⅜ approximately to the *f* of 45,056. The lower limit is determined by means of giant tuning-forks, of vibrating strips (*lamellæ*) of steel, or of weighted wire forks; the upper limit by miniature tuning-forks, by small steel cylinders, and by an adjustable piston-whistle (Galton's whistle) actuated by a rubber bulb. Between these extreme limits the ear can distinguish no less than 11,000 tonal qualities, or more than 100 times as many as are employed by orchestral music. So acute is our discrimination of tones that, in the middle region of the musical scale, two tones



AUDITION.

The series of tonal qualities. The keyboard of a grand piano extends from the A_2 of 27½ vs. to the c^5 of 4224 vs. The range of audition is approximately from the G_3 of 12⅜ vs. to the e^8 of 45,056 vs.

will be judged as different by a trained observer whose vibration rates differ by but 0.2 vibration in the 1 sec. Measurements of this sort require a delicate apparatus, which has usually taken the form of a series of tuning-forks, whose pitch can be varied at will by the movement of a rider along their prongs, or of a series of reeds, very carefully tuned to minute differences of pitch, sounding under wind pressure.

The psychology of the simple noises is as yet incomplete. There seems to be no doubt that noises show differences of quality or pitch more or less resembling those of tones. The crack of a pistol is 'higher' than the roar of a cannon; the snap of a large soap-bubble is 'deeper' than the snap of a small one. Experiments have been made in which the sound of a tuning-fork is cut off from the observer's ear before the prongs have executed two complete wave-movements; the sound in such a case is not a tone, but a noise. The results seem to indicate that we can distinguish between 500 and 600 simple noises, or that there are about 20 times fewer noise than tone sensations. This statement, however, requires confirmation. It has recently been suggested that there are two ultimate types of simple noise: the snap (electric spark, soap-bubble, curtailed sound of fork) and the hiss; but no classification of hisses by pitch or quality has been attempted.

A word must be said about two striking phenomena of auditory sensation—beats and combination-tones. (1) If two tones whose vibration-rates are slightly different are sounded together, the resulting sound is not smooth, but 'wavy': it fluctuates in intensity, according as a hill of the one curve coincides with a hill or with a valley of the other. Thus two tones of 100 and 101 vibrations in the 1 sec. beat once in the 1 sec.; tones of 100 and 102 beat twice; and so on. Beats can be counted up to about 5 in the 1 sec., and can be heard separately up to about 60; beyond this limit the beating complex merely sounds harsh and rough. In certain cases the two beating tones give rise to a third—intermediate—tone which carries the beats. (2) If two tones are sounded together, various extra-tones are generated, whose vibration-rates stand in definite relations to the vibration-rates of the primary tones. Most important, theoretically, are (*a*) the first difference-tone and (*b*) the summation-tone. The pitch-number of the former is equal to the difference between the vibration-rates of the two generators. Thus tones of 300 and 400 vs. produce a first difference-tone whose pitch-number is 100. The pitch-number of the latter is equal to the sum of the vibration-rates of the generators; thus tones of 300 and 400 vs. produce a summation-tone of 700. It is probable that the difference-tone is a beat-tone, and that the summation-tone is due to the presence of overtones in the primaries. See CLANG-TINT.

Sensations of sound appear to have developed from general bodily sensations of jar or tremor. (See STATIC SENSE.) The first auditory sensation proper is, probably, the noise; this theory is borne out by facts of genetic psychology as well as by the circumstance that, for our own ears, the physical stimulus of noise is an imperfect tonal stimulus: the sensations are different in kind, but their exciting causes differ only in degree. The ruling theory of audition, that of Helmholtz (q.v.), maintains that tonal sensations are set up by the vibration of the cross-fibres of a triangular membrane stretched between the bony walls of the cochlea of the internal ear. This 'basilar' membrane represents, in miniature, the arrangement of a harp, or of the backboard of an upright piano; the long strings are tuned to the bass tones, the short strings to the treble tones. The external air-wave strikes the drumskin of the ear, is transmitted inward by the chain of auditory ossicles, and arouses a wave-movement in the endolymph of the internal ear. The motion is taken up by that basilar fibre which is 'tuned' to its particular rate; the motion of the fibre excites the hair of a sensory cell resting upon it; and the nervous impulse passes from this cell along the auditory nerve to the brain. An overlying membrane, the 'tectoria,' acts as damper, to bring the vibrating hair to rest again. The details of the theory, as amended by Hensen, Exner, and Ebbinghaus, afford a fairly satisfactory explanation of the details of auditory sensation. We have seen that there are some 11,000 tonal qualities. It has been found that the basilar membrane consists of 16,000 to 20,000 cross-fibres—more than enough to serve as the basis of these sensations. The qualities of noise we may suppose to be mediated by the simultaneous jarring of a number of adjacent basilar fibres. Beats are accounted for on the hypothesis that the incoming air-wave sets in vibration not only the basilar fibre which is specifically attuned to it, but (in a lesser degree) the neighboring fibres as well. If, then, two fibres that lie near together within the membrane are set swinging by two waves of but slightly different rates, the fibres lying between these two will also be affected, and affected by both stimuli. There is, consequently, interference of the two wave-motions in this narrow intermediate strip of membrane, and the intermediate tone (which carries the beats) is aroused. Combination-tones were explained by Helmholtz as due to asymmetrical vibrations of the conductive apparatus (ossicles and membranes). The explanation is, however, unsatisfactory; it divorces the difference-tones from the beats, placing the one in one part of the ear and the other in another; and it offers no reason for the intensity of the difference-tones. Ebbinghaus has restored these tones to the cochlea by two simple and natural extensions of Helmholtz's principles. He supposes—(*a*) that, a simple wave-movement of the endolymph excites a limited number of adjacent fibres, and thus a number of hair-cells; and that the cells are not so sharply differentiated in function but that all alike (though in varying degrees) can mediate the same tonal sensation; and (*b*) that a given wave-motion excites not only its own particular basilar string, but also (within certain limits) the strings that are attuned to its harmonic undertones. Thus a stimulus of 600 vibrations in the 1 sec. would, perhaps, excite the strings attuned to 599.6, 599.8, 600, 600.2, 600.4; and the cells lying upon these strings would all alike give the tone 600 in sensation. Moreover, the stimulus 600 would excite not only the 600-string, but also the strings that respond directly to stimuli of 300, 200, 150, 120, etc. These assumptions afford an easy explanation of the phenomena in question. We may add that the Helmholtz theory has received confirmation on the pathological side by the discovery that, in certain individuals, the hearing of tones is abrogated over a definitely circumscribed portion of the scale (tonal gap), or is abrogated in general, but retained over a similarly circumscribed area (tonal island)—facts that accord admirably with the functions ascribed hypothetically to the strings of the basilar membrane. Vivisectional experiments on dogs seem to show that excision of the tip of the cochlea (where the membrane is widest) produces a deafness to bass tones; but confirmation of this is required.

In spite of its explanatory powers, the Helmholtz theory has never lacked opponents. Various objections have been urged against it; as, that the theory, in assuming that the ratio of width of the two ends of the basilar membrane is about 1 : 12, greatly overstates the triangularity of the membrane; that the membrane is too closely woven for its radial fibres to vibrate, even in small batches, not to speak of the separate vibration of single fibres; that the structures of the cochlea are too minutely small for the strings to act as resonators to the deep tones which audition can distinguish; and so on. Hence, a number of theories have arisen which reject the idea of resonance altogether, and assume that the basilar membrane vibrates in one piece. Waller's theory, which we may take as typical of this direction of thought, is formulated as follows: the basilar membrane is 'a long, narrow drumhead, repeating the complex vibrations of the membrana tympani.' It "vibrates in its entire area to all sounds (although more or less in some parts than in others), giving . . . acoustic pressure-patterns between the membrana tectoria and the subjacent field of hair-cells. In place of an analysis by consonation of particular radial fibres, . . . varying combinations of sound give varying pressure-patterns, comparable to the varying retinal images of external objects." No one of these opposing theories has been worked out in any considerable detail. (See EAR; ACOUSTICS; PSYCHOLOGICAL APPARATUS.) Consult: Helmholtz, *On the Sensations of Tone* (Eng. trans., London, 1895); Ebbinghaus, "Psychologie," in *Zeitschrift für Psychologie* (Hamburg, 1897-1902); Waller, *Introduction to Human Physiology* (New York, 1891).

AU'DITOR (Lat., hearer, from *audire*, to hear). At common law, an officer appointed by the court in the action of account or account render to take and state the items of debit and credit between the parties to the action, determine the balance due, and report to the court.

Similar officers were appointed in chancery, who were more usually known as masters in chancery. (See MASTER IN CHANCERY.) As the common-law action of account fell into disuse, courts of common law ceased to appoint auditors; but under modern statutes, the law courts have power to appoint officers exercising quasi-judicial functions in the taking of accounts, taking of evidence, trial of issues, etc., variously known as auditors, commissioners, or referees. (See COMMISSIONER; and REFERENCE.) Their reports, when filed and confirmed, form the basis of the judgment rendered by the court. The powers and duties of such officers are, in general, limited and defined by the statutes authorizing their appointment.

The term auditor, as now employed, however, more commonly has reference to two classes of persons, usually expert accountants, who have increased in numbers to meet the demands of the growing importance and complexity of industrial and financial affairs, and who perform the service of examining and stating the accounts of Government departments, corporations, and private concerns. Many of our large cities, as well as the State and general governments, have official auditors (called, in New York City, commissioners of accounts) as a part of the regular administrative machinery; and the same is true of many of the larger industrial corporations. Private auditors are ordinarily subject to no legal regulation, except such as is imposed by the contract under which they are employed, and the general obligation to exercise a reasonable degree of skill, care, and caution. A higher degree of skill is required of a professional auditor than of one who does not hold himself out as an expert; such skill, in fact, as is exacted of all strictly professional men. In some of the States of the United States a class of public accountants, licensed and registered by the State, is recognized by statute. For the law as to auditors under the English Companies' Acts and other acts, consult Pixley, *Auditors: Their Duties and Responsibilities*, 7th ed. (London, 1896).

AU'DITORY, or **EIGHTH, NERVE.** According to the older nomenclature, the *portio mollis* of the seventh pair. The nerve connected with the special sense of hearing. The apparent origin of this nerve is from the ventrolateral surface of the medulla immediately behind the transverse fibres of the pons. Of the two distinct bundles of fibres that can be distinguished in it, one (the cochlear division) passes to the outer side of the restiform body, or inferior peduncle of the cerebellum, while the other (the vestibular division) passes to the inner side of the restiform body. The fibres terminate in three nuclei. Of these, two are situated in the gray matter of the fourth ventricle, and are known respectively, from their positions, as the median nucleus and the lateral nucleus of the eighth nerve. The third, or accessory nucleus, is a group of cells just ventral to the restiform body at the point of convergence of the two roots. The fibres of the cochlear division of the nerve are the axones of cells situated in the spiral ganglion, or ganglion of Corti; these cells are bipolar, and their peripheral termination is, in Corti's organ, situated within the bony cochlea, the ends of the fibres of the cochlear division mainly in the lateral nucleus. The fibres of the vestibular division of the nerve are the axones of cells situated in Scapa's ganglion of the internal ear; these cells are also bipolar, their peripheral terminations being among the hair-cells of the *crista* and *macula acustica* in the vestibule and semi-circular canals; the ends of the fibres of the vestibular division are mainly in the median and accessory nuclei. By means of neura, whose cell-bodies are situated in these nuclei, auditory impressions are transmitted to higher centres.

The auditory nerve leaves the cranial cavity, in company with the facial nerve, by means of the internal meatus. At the bottom of the meatus the two divisions of the nerve separate, the vestibular branch passing to the vestibule and semi-circular canals, the cochlear branch passing to the cochlea. Within the meatus the auditory nerve is connected by one or two filaments with the facial. See EAR.

AUDLEY, a̤d′lĭ. A manufacturing town in Staffordshire, England, 4½ miles west of Newcastle-under-Lyme (Map: England, D 3). Population, in 1891, 12,600; in 1901, 13,700.

AUDLEY, or **AUDELEY**, Sir JAMES DE (c.1316-69). An English knight. In 1346 he went to France in the retinue of Edward III. and the Black Prince, and in 1351 participated in the naval combat with the Spaniards off Sluis. At the battle of Poitiers (September 19, 1356), he fought with signal valor at the forefront of the English Army, until overcome by wounds. For his bravery he received an annuity from the Black Prince, who also in 1362 appointed him Governor of Aquitaine. Later he became great-seneschal of Poitou. He was one of the original knights-companions of the Order of the Garter, instituted by Edward III.

AUDLEY, THOMAS, Baron AUDLEY OF WALDEN (1488-1544). An English lord chancellor under Henry VIII. He was chosen Speaker of the Commons in 1529, was made a knight and Keeper of the Great Seal in 1532, and became Lord Chancellor in 1533, succeeding Sir Thomas More, at whose trial he presided. He also conducted the trials of Bishop Fisher, of the supposed accomplices of Anne Boleyn, and of the paramour of Queen Catherine Howard. Throughout his public life he was little more than a tool in the hands of the King and his minister, Cromwell.

AU′DOE′NUS, JOANNES. See OWEN, JOHN.

AUDOUIN, ô′dōō-äɴ′, JEAN VICTOR (1797-1841). A French naturalist, born in Paris. With Dumas and Brongniart he began the *Annals of Natural Science* in 1824, and with Milne-Edwards made researches on crustacea and annelida. He was professor of entomology in the Museum of Natural History in Paris, and in 1838 became a member of the Academy of Sciences. He was also the founder and first president of the Entomological Society. He investigated, at the request of the Government, the injuries done to vine and silk culture by insects, and contributed a great number of reports and papers on this subject. He also contributed the part on insects in Cuvier's *Règne animal*.

AUDRAN, ô′dräɴ′, EDMOND (1842-91). A French composer. He was born at Lyons; studied music in Paris, and in 1861 followed his father, a teacher at the Conservatory of Marseilles, to that city, where he became choral director at the Church of Saint Joseph. He returned to Paris in 1881, and collaborated with MM. Chivot and Duru on a number of comic operas, of which the following are the most important: *La mascotte* (1881), a great success; *Olivette*, *Le Grand Mogol* (1884); *Miss Helyett* (1890); and *La poupée*.

AUDRAN, GÉRARD (1640-1703). One of the most celebrated engravers of the French school. He was born at Lyons; studied under his father, and at Rome under Carlo Maratti, and acquired a high reputation by his engraving of Pope Clement IX. He was then recalled to France by Colbert, and appointed engraver to Louis XIV. His masterpieces are a series of engravings illustrating the battles of Alexander, after the paintings of Lebrun. He published a work entitled *Les proportions du corps humain* (1683).

AUDREY, a̤′drĭ. (1) A shepherdess in Shakespeare's pastoral comedy, *As You Like It*. Her relations, as the untutored child of nature, with Touchstone, the motley of a court, form some of the most diverting scenes of the play. (2) A character in Jonson's comedy, *A Tale of a Tub*. (3) The title of a popular novel by Mary Johnston (1902).

AUDREY, SAINT. See ETHELREDA.

AUDUBON, a̤′du-bon, JOHN JAMES (1780-1851). An American naturalist. He was born at Mandeville, in Louisiana, then a Spanish colony, on May 5, 1780, and died January 27, 1851. This date of his birth, however, is merely a tradition; and probably he was born some years before that. His father was a wealthy French naval officer, who owned estates in Santo Domingo; his mother, a Spanish creole. His childhood and youth were spent in France, where he was educated, and where he was given instruction in drawing by the painter David. In 1798 he came to America and settled on a farm on the Perkiomen River, near Philadelphia. His father had acquired the property during the Revolutionary War, and now gave it to him. Here he lived ten years, collecting and sketching birds, and applying himself otherwise merely to field sports and social enjoyment. In 1808 he married Lucy Bakewell, the daughter of a neighbor, an Englishman, and at once migrated to the West. After passing ten years in a vain effort to establish himself in business in Kentucky and Louisiana, and finally losing all his property, he was reduced to supporting himself by drawing portraits, and even teaching dancing and fencing. This came about from his persistent inattention to business, which was constantly neglected, as he acknowledges in his autobiographic memoranda, for the sake of pursuing his studies and drawings in natural history, or merely for the pleasures of hunting, fishing, and wandering in the woods. No deepening of his difficulties could cure him of his heedlessness, or cause him to forego any opportunity to add to his knowledge or series of drawings of birds.

In 1824 his projects were forwarded by a visit to Philadelphia, where he first became known to the intellectual society of the country and his abilities were recognized. Two years more of painting, teaching, and study, aided by his wife, enabled him to go to England to try to carry out his long-cherished plan of publishing his drawings of birds in a complete series of life-sized colored figures. He interested a sufficient number of subscribers to enable him to begin in London, in 1827, the publication in folio parts, at two guineas each, of his *Birds of America*, which excelled anything of the sort then extant. About five were then issued annually until its completion, in 1838, in 87 parts, containing 435 plates, giving 1065 figures. A complete good copy (of which about 175 sets are supposed to be in existence, 80 of which are in America) is now worth about $2000. No reading matter accompanied these plates, but this was prepared later, and published in Edinburgh, from 1831 to 1839, in five successive volumes, entitled *Ornithological Biography*, the technical part of which was prepared by William McGillivray. Several editions and reprints, with reduced drawings, were made subsequently, of which the most important was the octavo edition of 1844, entitled *Birds of America.* A complete account of these combined works, and of all Audubon's other ornithological writings, is given in the appendix to Elliott Coues's *Birds of the Colorado Valley* (Washington, 1898). The years from 1830 to 1842 were spent in almost incessant travel in all accessible parts of the United States and Canada in search of new materials, or else in Europe, attending to the publication and sale of his great work. In 1842, however, Audubon purchased an estate on the bank of the Hudson River, now included within the city of New York, where a beautiful home was established for himself and his sons, Victor and John Woodhouse, and their families. In 1843, Audubon made a fruitful journey to the upper Missouri River region, the results of which were included in the first octavo edition of his *Birds of America* (1844). Thenceforth he devoted his energies mainly to the preparation of a standard work on American mammals, for which his sons not only collected much material, but for which John drew half of the colored plates; while John Bachman contributed technical and other parts. It was published in New York as Audubon and Bachman's *Quadrupeds of North America*, the first volume dated 1846 and the last 1853-54.

Audubon failed rapidly after 1847, gradually lost the use of his mind, died in 1851, and was buried in Trinity Cemetery, New York, close to his home woods, which now form a beautiful district called Audubon Park. As a man he was endowed with a hardy and most attractive frame, a most winning disposition, and a brilliant, poetic mind, animated by untiring enthusiasm. He was not learned in science, nor an artist in any broad sense of the term: but his work has been a source of immense pleasure and inspiration.

The best and fullest biography of him is by his granddaughter, Maria R. Audubon, entitled *Audubon and His Journals*, with zoölogical and other notes by Elliott Coues (2 vols., New York, 1897). A previous *Life of John James Audubon, the Naturalist* (New York, 1869) was written by another relative, Lucy Audubon. Still earlier is Buchanan's *Life and Adventures of J. J. Audubon* (2d ed., New York, 1864), which contained many errors and was not approved by his family.

AUE, ou'e, Hartmann von (c.1170-1210). A German minnesinger. He was the retainer of a Swabian knight, and is said to have had an exceptional education for a layman. He took part in the crusade of 1190, and is celebrated in the *Tristan und Isolde* of Gottfried von Strassburg and in the *Krone* by Türlin. His earliest poem seems to have been *Erec* (about 1190). Among his other productions are: *Gregorius vom Steine; Der arme Heinrich* (his most popular work); *Iwein, oder der Ritter mit dem Löwen.*

AUE. A town in the Circle of Zwickau, Saxony, Germany, at the confluence of the Mulde and the Schwarzwasser, 18½ miles southeast of Zwickau by rail. It is a railway junction and a busy industrial centre. It has five public buildings and its institutions include a technical school in connection with the tin industry. Population, in 1900, 15,230.

AUENBRUGGER, ou'en-brụg'ẽr, or **AUENBRUGG**, ou'en-brụg, Leopold von (1722-1809). A Viennese physician who introduced the method of percussion diagnosis—that is, the method of applying the ear to the chest and noting the sounds that follow a stroke of the hand on the patient. He published the results of his important investigation in a treatise entitled *Inventum Novum ex Percussione Thoracis Humani Interni Pectoris Morbos Detegendi* (1761), which marks an epoch in the modern history of medicine. The book attracted little attention until it was translated and illustrated by Corvisart in 1808. He also wrote two treatises on insanity.

AUER, ou'ẽr, Alois, Ritter von Welsbach (1813-69). An Austrian printer. He was born at Wels, in Upper Austria, and was trained in a printing establishment of his native town to be a compositor. During his scanty leisure moments he studied French, Italian, English, and other languages, in which he underwent an examination in 1835 and 1836 before the University of Vienna. In October, 1837, he was appointed professor of Italian in the Gymnasium of Linz, in Upper Austria. In 1839 he set out on his travels through Germany, Switzerland, France, and England, collecting materials for his favorite art. From 1841 to 1868 he was director of the Imperial printing office at Vienna, which under his management became one of the largest establishments of the kind in Europe. He was prolific in typographical inventions and made known a photographic discovery, 'spontaneous impression,' in *Die Entdeckung des Naturselbstdrucks* (1854); published *Die Sprachenhalle oder das Vaterunser in 608 Sprachen*, with Roman types (1844); and *Das Vaterunser in 206 Sprachen*, with their national alphabets (1847). See Nature Printing.

AUER, Leopold (1845—). A violinist, born at Veszprim, Hungary, and educated at the Conservatory of Budapest and at Vienna. From 1863 to 1865 he was concert master at Düsseldorf, and from 1866 to 1868 he held the same position at Hamburg, under Stockhausen. Afterwards he became professor at the Conservatory of Saint Petersburg and violin soloist to the Russian court. In 1887, he became director of the symphonic concerts given by the Imperial Musical Society of Russia. He is considered one of the foremost violinists of the day, his playing being characterized by extraordinary technical skill, depth of conception, and remarkable beauty of tone. His concert tours have been very successful.

AUERBACH, ou'ẽr-bäG, Berthold (1812-82). A German novelist, born at Nordstetten. He was the founder of the contemporary German 'tendency novel,' in which fiction is used as a means of influencing public opinion on social, political, moral, and religious questions. Auerbach was of humble, Jewish parentage, but had a liberal education at Tübingen, Munich, and Heidelberg, and was a close student of Spinoza, whose complete works he translated (1841). Spinoza's philosophy can be traced in the ethics of his novels of the higher social life. His life was uneventful, though embittered at the close by the growth of German anti-Semitism. His best-known works are *Das Judentum und die neueste Litteratur* (1836); a semi-biographical novel, *Spinoza* (1837); *Dichter und Kaufmann* (1839); *Der gebildete Bürger*, an attempt to popularize philosophical subjects (1842); *Schwarzwälder Dorfgeschichten* (1843)—his first great success, widely translated, and expressing with a sympathetic realism the memories and scenes of youth. This was followed in the same field by the hardly less charming second series of *Village Tales* (1846), *Barfüssele* (1856); *Joseph im Schnee* (1861); *Edelweiss* (1861): a third series of tales, *Nach dreissig Jahren* (1876), *Der Forstmeister* (1879), and *Brigitta* (1880). Meantime he had written a mass of now insignificant journalistic work, and, among other novels, *Auf der Höhe* (1865), a philosophic romance, blending peasant life and character with that of the higher circles in a royal capital and country-seat. This was an attractive exhibition of doctrinaire ethics, and established his reputation in spite of errors in construction and style. *Das Landhaus am Rhein* (1869) was similar but less successful, and *Waldfried* (1874) sought vainly to draw literary inspiration from German unity and the French war. The rest of his forty volumes are negligible. All Auerbach's longer work is overweighted with philosophy and a leaden humor. He is best in emotional situations and the sentiments of simple natures; excellent in description, but weak in the management of plot. Still, *Auf der Höhe* has enough inherent reality to triumph over its faults, is still read and worth reading. Auerbach's talent appears to best advantage in the *Dorfgeschichten* and in such modest stories as *Barfüssele*, *Edelweiss*, and *Brigitta*. Consult Zabel, *Berthold Auerbach* (Berlin, 1882).

AUERBACH'S KEL'LER. A Leipzig wine-cellar and tavern, which occupies much the same place in the hearts of Goethe-lovers that the London 'Cheshire Cheese' holds in the hearts of the admirers of Dr. Johnson. It is associated with the early life of the German poet, who in his student days was a regular *habitué* of it, and is supposed to be the original of the tavern scene in the drama of *Faust*.

AUERSPERG, ou'ẽr-spĕrk, Adolph Wilhelm Daniel, Prince (1821-85). An Austrian statesman. He served in the army from 1841 to 1860, and attained to the rank of major. In 1867 he entered political life as a member of the Bohemian Diet, being elected by the Liberal land proprietors, and in 1868 became a member for life of the Upper Chamber of the Austrian Reichsrat. He was Governor of Salzburg from 1870 to 1871, and proved in that position, as well as in his subsequent political life, a stanch supporter of the constitution. From 1871 to 1879 he was the head of the Austrian ministry, as such succeeded in carrying out the electoral reform, securing direct elections to the Lower Chamber of the Reichsrat, and in strengthening the political entente with Hungary.

AUERSPERG, Anton Alexander, Count von (known to literature as Anastasius Grün) (1806-76). An Austrian statesman and poet. He was born at Laibach (Carniola), studied at Gratz and Vienna; through his verse became distinguished as a Liberal; was elected to the German preliminary Parliament in 1848, and subsequently to the National Assembly. Under the Constitution of 1861 he was appointed by the Emperor a life member of the House of Lords, where he continued prominent in opposition to the Feudal-Clerical and Slovenian parties. He was similarly active in 1861-67 in the diets of Carniola and Styria. His first noteworthy publication was *Der letzte Ritter* (1830; new ed., 1885), a celebration of Maximilian I., in the metre of the *Nibelungen-Lied*. With *Spaziergänge eines Wiener Poeten* (1831; new ed., 1835), an attack upon the Metternich régime, he attracted great attention. Chief among his further publications are the *Volkslieder aus Krain* (1850), and *Robin Hood* (1864), an adaptation of the English ballad material. His poetry is eminently contemplative, and at times overburdened with the author's reflections. In its assertion of freedom it was influential during the political controversy of the time, and it still may be read for a number of genuine lyrics. His *Gesammelte Werke* were edited by L. A. Frankl (Berlin, 5 vols., 1877). Consult: Schatzmayer, *Anton, Graf von Auersperg* (2d ed., Frankfort, 1872), and Radics, *Anastasius Grün* (Leipzig, 1878).

AUERSPERG, Carlos, Prince (1814-90). An Austrian statesman. On the advent of the new constitutional era, in 1861, he became a member of the Upper Chamber of the Reichsrath. As a representative of the Liberal landed proprietors in the Diet of Bohemia, and afterwards as president of the Austrian House of Peers, he took a conspicuous part in defending the constitutional system against clerical and feudal reaction, and in establishing the unity of the Empire. He presided over the Austrian ministry in 1868, and subsequently was a zealous supporter of the Liberal Cabinet, at the head of which was his brother Adolph.

AUERSTÄDT, ou'ẽr-stĕt. A village in Saxony, 25 miles northeast of Weimar. Here Davout won a great victory over the Prussians under the Duke of Brunswick on the same day (October 14, 1806) that Napoleon defeated their main army at Jena. The battle was fought in a mist, between 48,000 Prussians and 30,000 French. The Prussians lost one-half of their army, while Davout's loss amounted to 7,000 men. Consult Lettow-Vorbeck, *Der Krieg von 1806 und 1807*, Vol. I., *Jena und Auerstädt* (Berlin, 1891).

AUF DER HÖHE, ouf dẽr hē'e. See Auerbach, Berthold.

AUFFENBERG, ouf'en-bĕrk, Joseph, Baron von (1798-1857). A German dramatist. He was born at Freiburg, where he first studied law, but soon began to write dramas. He became president of the committee of the Court Theatre at Karlsruhe several years afterwards. The following are a few of his more important dramatic works: *Pizarro* (1823); *Ludwig XI. in Peronne*; *Der Löwe von Kurdistan*; *Alhambra*; *Das Nordlicht von Kasan*. An edition of his complete works (22 vols.) was published at Wiesbaden in 1855.

AUFRECHT, ouf'rĕkt, Theodor (1822—). A German philologist and Sanskrit scholar. He was born at Leschnitz and was educated at the

University of Berlin. He early devoted himself to Oriental research, and at the age of twenty-five published a treatise on Sanskrit accent (Bonn, 1847). In collaboration with Kirchhoff, he issued *Die umbrischen Denkmäler* (1849-51), and with Adalbert Kuhn he founded the *Zeitschrift für vergleichende Sprachforschung* (1852). In 1862 he was appointed professor of Sanskrit and comparative philology at the University of Edinburgh, which in 1875 conferred upon him the degree of LL.D. Shortly afterwards he left Scotland, and accepted a professorship at Bonn, resigning his position in 1889. Among Dr. Aufrecht's many contributions to linguistic science, the most important are an edition of the *Rigveda* in English letters, *Ujjvaladatta's Commentary*, from a manuscript in the library of the East India House (1859), *Aitareya Brahmana* (1879); and *Catalogus Catalogorum, An Alphabetical Register of Sanskrit Works and Authors* (Leipzig, Part I., 1891; Part II., 1896).

AUGARTEN, ou'gär-ten (Ger. *Aue*, meadow + *Garten*, garden). A park in Vienna, once noted for its musical associations. Mozart, in 1782, was instrumental in starting concerts there, and it has been the scene of many musical first nights. It was opened in 1775 by Joseph II., and is laid out in the old French style.

AUGE, a̤'jē. See Telephus.

AU'GEAS (Gk. *Αὐγέας*, *Αὐγείας*, *Augeias*). The son of Helios, Eleios, or Poseidon, and Hyrmina or Iphiboë. He was King of Elis, and renowned for his wealth in oxen, of which he fed 3000 head in his stables. The cleansing of these stables, from the accumulations of years, in a single day, was one of the labors imposed on Hercules by Eurystheus. The hero bargained with Augeas for a tenth of the oxen as his reward, and then turned the rivers Alpheus and Peneus through the mass of ordure, thus accomplishing his promise. When Augeas refused to pay the stipulated wages, a war ensued and Augeas was slain by Heracles. The fable of the Augean stables serves as an allusion to political corruption. See Hercules.

AUGEREAU, ōzh'rō', Pierre François Charles, Duke of Castiglione (1757-1816). A marshal and peer of France. He was born at Paris, and after serving some time in the French carabineers, he entered the Neapolitan service, in which he remained until 1787, when he settled in Naples as a fencing-master. With other French residents he was banished from that city in 1792, and immediately volunteered in the French Revolutionary Army. In less than three years he was made general of a brigade. In Bonaparte's Italian campaign of 1796 he greatly distinguished himself in the field and in council. He took an active part in the battles of Millesimo, Ceva, Lodi, Castiglione, (from which he received his title), Roveredo and Bassano. In 1797 he was appointed to the command of the Army of the Rhine; but within a few months the Council of Five Hundred, not liking the spirit he displayed there, made him commander of the Tenth Division, at Perpignan. This post he resigned in 1799, when he was elected to the Council of Five Hundred. In 1800 he received the command of the army in Holland, and was active in several engagements. In 1804 he was made a marshal. He fought at Wetzlar, Jena, Eylau, in Italy (1809), in Spain (1810), and at Leipzig (1813). During the campaign of 1814 he disappointed the expectations of Napoleon, who had placed great trust in him. Mistrusted by the restored Bourbons, he lived in retirement on his estate till his death in 1816. His character was far from admirable: he was rough, cruel, and selfish; he plundered shamelessly, and bought plunder at reduced rates from his men. But he was a brilliant leader and a fearless soldier in the field.

AU'GERSHELL. The general English name of gastropod mollusks of the family Terebridæ, suggested by their elongated, sharply pointed spiral form, and solid substance (see Plate of Abalone, etc.). They appear by their dentition to be related to the cones and pleurotomes, but otherwise are very distinct, having a very small body and short siphon, proportionately, with the foot short and rounded in front and elongated behind, tipped with a small operculum. They are carnivorous, and the eyes in many species are almost invisible, and in all are borne upon minute stalks. More than 200 species are known, most of which are inhabitants of the tropical seas and of the South Pacific. The shells are slender, acuminate, sometimes several inches in length, and often very solid, with flat whorls ornamented with spiral sculpturing, and usually variegated with red, brown, and orange spots and stripes. They occur all the way from the shore to rather deep water, creeping on the bottom in search of prey. The history of the family goes back to the Miocene period. For illustration see Abalone, etc.

AU'GERWORM'. The larva of the British goat-moth (q.v.).

AUGIER, ō'zhyȧ', Emile (1820-89). Probably the greatest French dramatist of the Nineteenth Century. When comedy was in danger of being stifled between the vaudeville of Scribe and the sensational drama of the Romanticists, he, with the younger Dumas, raised it to a more vigorous, realistic life, and a truer contemporary morality than it had known since Molière. Augier was born at Valence, September 17, 1820, and at first practiced law; but he inherited from his grandfather, Pigault-Lebrun, a prolific though mediocre novelist, a bent for literature, and wrote while still in a notary's study *Charles VII. à Naples*, which was a failure. *La ciguë*, acted in 1844, showed promise, and was approved by Ponsard (q.v.). It achieved success, and decided the dramatist's career. It was a Greek play, graceful, witty, and like *Le joueur de flûte*, written also at this time, though not acted until 1850, it pleads, in easy verse, the cause of the courtesan redeemed by love, which his later prose dramas eloquently condemn. *L'aventurière* (1848) presents the same theme in a French setting, and was rewritten to suit his later position in 1860. He was still feeling his way, and is next found collaborating with Alfred de Musset in *L'habit vert* (1849), a trifle, and, like *Le postscriptum* (1869), a failure. Then, with *Gabrielle* (1849), begins Augier's second manner. In this 'domestic drama' he becomes the champion of average, conventional ethics, allaying the calculations of interest to the language of sentiment, as the Romanticists had never done. From this position *Diane* (1852) shows a momentary recoil, *Philiberte* (1853) a slight advance, and *La pierre de touche* (1853) a decided progress, thanks, perhaps, to the collaboration of Sandeau, who also furnished the plot for *Le gendre de M. Poirier* (1855)—Augier's first great drama, and thought by many the greatest since Beaumarchais's *Mariage de Figaro*. It is a model comedy of manners, its comic force resting wholly on the interplay of characters, every one of whom is drawn to and from the life, without idealism and yet with no touch of bitterness, such as is felt in Augier's *Ceinture dorée* (1855), a satire of conventional marriage and the stock-exchange, foreshadowing his great series of social satires that begins with *Les effrontés* (1861).

Progress toward sterner ethics may be noted in *Le mariage d'Olympe* (1857), which earned Augier his election to the Academy. *La jeunesse* (1858) is insignificant, but *Les lionnes pauvres* (1858) contains, in the cold, cowardly and perverse Séraphine, Augier's greatest female character, and verges on tragedy in the dread of destiny that it rouses at the close. *Un beau mariage* (1859) completes the cycle of 'domestic dramas,' and *Les effrontés* (1861) turns to the corrupting of society through the struggle for unearned wealth. Here Vernouillet is the typical speculator, and Giboyer the typical venal wit, who, in *Le fils de Giboyer* (1862), becomes a hardly disguised portrait of the clerical journalist, Louis Veuillot (q.v.). In no drama of Augier's is the interest more unflagging, the irony more caustic, and the dialogue more sparkling, than in this triangular struggle between a decaying aristocracy, a vain plutocracy, and the unscrupulous exploits of both. The dramas that follow hardly reach this height. *Maître Guérin* (1864) is a fine study of the tricky country lawyer; *Paul Forestier* (1868) is insignificant; *La contagion* (1866) and *Lions et renards* (1869) elaborate the theme of *Les effrontés*, and show in Estrigaud a type of the Parisian *blagueur*. After the Franco-German War, Augier wrote the patriotic, but prosaic, *Jean de Thommeray* (1873), *Madame Caverlet* (1876), dealing with divorce, and *Les Fourchambault* (1878), which pushes the illegitimate son to the front, and marks by its melodramatic sentiment the beginnings of a reaction from literary naturalism. Augier's style is vigorous, often daring, in its use of new words, and even of slang. His moral earnestness makes him at times harsh; but he looked at the world with the honest sympathy of an upright and sincere student of nature. He died at Croissy, October 25, 1889. Consult: Parigot, *Emile Augier* (Paris, 1890); Lacour, *Trois théâtres* (Paris, 1880); Doumic, *Portraits d'écrivains* (Paris, 1894); Matthews, *French Dramatists* (New York, 1881).

AUGITE, a̤′gīt. See Pyroxene.

AUG′MENTA′TION, in Heraldry. See Heraldry.

AUGMENTATION. In music, the repetition of a theme in such a manner that each note is increased to double its original value. Augmentation occurs most frequently in the fugue, but also has its value in the free style of writing. For augmentation of intervals, see Interval.

AUGSBURG, ougz′bụrᴋ (Lat. *Augustus*, the Roman Emperor who built it + Ger. *Burg*, fort, stronghold: anc. *Augusta Vindelicorum*, Augusta of the Vindelici). Capital of the Bavarian Government district of Suabia and Neuberg, situated in latitude 48° 21′ N., longitude 10° 54′ E., about 1625 feet above sea-level, on the point of land formed by the junction of the rivers Wertach and Lech, 39 miles west-northwest of Munich by rail (Map: Germany, D 4). It has a mean annual temperature of about 45° F. It consists of the inner town and six suburbs, and in spite of the fact that its ancient fortifications have been removed, and their place taken by broad avenues and squares, the town still presents a distinctly mediæval appearance, several of the streets, such as the Jacoberstrasse and Barfüssergasse, being rich in buildings of the Sixteenth and Seventeenth centuries. The main thoroughfare is the handsome Maximilianstrasse, lined with numerous interesting buildings and adorned with three fine bronze fountains. Several of the churches are fine Gothic structures, notably the cathedral, begun in 995 as a Romanesque basilica, but altered in the Fourteenth Century to the Gothic style, with fine bronze doors, old stained-glass windows, and several altar-pieces by Holbein the elder. Among the others may be mentioned the Church of Saint Anna, dating from the Fifteenth Century, with several valuable altar-pieces; and the beautiful memorial chapel of the Fugger family; the two churches (Roman Catholic and Protestant) of Saint Ulrich, the former being particularly rich in ornamental metal work; and the Church of the Holy Cross, dating from the Twelfth Century. The most notable of the secular buildings is the handsome Renaissance Rathaus, built in 1615-20, by Elias Holl, and containing the famous so-called Golden Hall, one of the finest halls in Germany; the former palace of the prince-bishops in which in 1530 the Augsburg Confession (q.v.) was presented to the Emperor; and the Fugger House, with rich frescoes, illustrating the history of the town. There is a picture gallery, containing a number of paintings belonging to the old German school, as well as several specimens of early Dutch masters. There are also a number of learned societies, a library with 200,000 volumes, and a collection of archives, containing many valuable documents relating to the early history of Germany. The town contains a fine theatre, opened in 1877, and publishes six daily newspapers. The charitable and benevolent institutions are numerous, and some of them were founded in the beginning of the Thirteenth Century. Augsburg has increased considerably in industrial importance during the Nineteenth Century. It contains large cotton and woolen mills, chemical works, paper-mills, and machine shops, which give employment to a third of its people. Population, in 1890, 75,523; in 1900, 88,700, the majority Roman Catholic.

Augsburg was founded in the year B.C. 15. It was laid waste by the Huns in the Fifth Century, by Charlemagne in the Eighth, and by Welf of Bavaria in the Eleventh; it rose each time only to greater prosperity. In 1276 it became a free city of the Empire, and reached the summit of its prosperity toward the end of the Fourteenth Century. About this time (1368) its aristocratic government was set aside for a democratic constitution, which lasted for 170 years, till the aristocracy, favored by Charles V., regained the ascendency. At the time of the Reformation it was one of the most flourishing cities of Europe, preëminent in commerce, manufactures, and art. By the side of Nuremberg it was an emporium of the trade between northern and southern Europe, and its merchants were princes whose ships were in all seas. (See FUGGER.) It was also the centre of German art, as represented by the Holbeins, Burgkmair, Altdorfer, and others. Many diets of the Empire were held in Augsburg, and the leading events of the Reformation are associated with its name. (See AUGSBURG CONFESSION.) The discovery of America, and of the road to India by the Cape, together with its sufferings during the Thirty Years' War, destroyed the town's prosperity. It lost its freedom with the abolition of the German Empire in 1806, and was incorporated with Bavaria. Consult: *Die Chroniken der schwäbischen Städte, Augsburg* (Leipzig, 1865-96); Lewis, "The Roman Antiquities of Augsburg and Ratisbon," in Vol. XLVIII., *Archæological Journal* (London, 1891).

AUGSBURG CONFES′SION. The chief credal statement of faith in the Lutheran Church. Its history is the following: With a view to an amicable arrangement of the religious split that had existed in Germany since 1517, Charles V., as protector of the Church, had convoked a diet of the Empire, to meet at Augsburg, on April 8, 1530, and had acquired from the Protestant States a brief summary of the doctrines in which they differed from the Catholic Church. The Elector John, of Saxony, therefore, in March, called on his Wittenberg theologians—Luther, Melanchthon, Justus Jonas, and Bugenhagen—to draw up articles of faith. They took as a basis, in so far as pure doctrine was concerned, articles signed at the Colloquy of Marburg (October 1-4, 1529) with the Zwinglians, substituting a strictly Lutheran one on the Lord's Supper, which had been adopted at Schwabach shortly after (October 16). These doctrinal articles, supplemented and with a practical part newly added, were laid before the Elector at Torgau (March, 1530). The Diet of Augsburg was opened June 20, 1530; but Melanchthon had arrived there on May 2, and on the way had begun the famous Confession. This he finished in Augsburg, using as material the articles mentioned and various other papers, besides frequently consulting with Luther, who stayed at Coburg; since, being under the Imperial ban, he was technically an outlaw, and could not safely attend the Diet. The document was first entitled an *Apology*, as if Lutheranism was on the defensive. It was also originally intended to be merely the reply of the Elector of Saxony, but it was so shaped as to be acceptable to all the princes and cities that had accepted Lutheranism in their Confession of Faith. It was a work of infinite labor, and reflected the highest credit on Melanchthon. Luther heartily indorsed it. At last, on Saturday, June 25, 1530, it was formally presented to the Emperor in the private chapel of the Episcopal Palace, where the Diet met. It was in both Latin and German, and was read aloud in German. But neither original was ever seen again by the Protestants, and both have probably perished.

The Augsburg Confession consists of these parts: I. Preface to the Emperor Charles V. II. Chief Articles of Faith: (1) Of God; (2) Of original sin; (3) Of the Son of God; (4) Of justification; (5) Of the ministry of the Word; (6) Of new obedience; (7-8) Of the Church; (9) Of baptism; (10) Of the Lord's Supper; (11) Of confession; (12) Of repentance; (13) Of the use of sacraments; (14) Of ecclesiastical order; (15) Of ecclesiastical rites; (16) Of civil matters; (17) Of Christ's second coming to judgment; (18) Of free-will; (19) Of the cause of sin; (20) Of faith and good works; (21) Of the worship of saints. (III.) Articles in which are recounted the abuses which have been corrected. (22) Of both kinds in the Lord's Supper; (23) Of the marriage of priests; (24) Of the mass; (25) Of confession; (26) Of distinction of meats; (27) Of monastic vows; (28) Ecclesiastical power. The document was signed by the Elector of Saxony, the two Dukes of Lüneburg, the Duke of Saxony, the Margrave of Brandenburg, the Landgrave of Hesse, the Prince of Anhalt, the Senate and Magistracy of Nuremberg, and the Senate of Reutlingen.

Melanchthon, not looking upon the Confession as binding, began shortly after to make some alterations in its expressions; at last, in 1540, he published a Latin edition (*Confessio Variata*), in which there were important changes and additions. This was especially the case with the article on the Lord's Supper, in which, with a view to conciliation, he endeavored to unite the views of the Lutherans and Calvinists. This gave rise subsequently to much controversy. Orthodox Lutheranism repudiated the alterations of Melanchthon, and long continued to subject his memory to great abuse: though it is clear that Melanchthon and his adherents contemplated no substantial departure in doctrine from the original Confession. Consult Jacobs, *The Book of Concord* (Philadelphia, 1882) for the Augsburg Confession, its documents, and full discussion.

AUGSBURG IN′TERIM. See INTERIM.

AU′GUR, CHRISTOPHER C. (1821-98). An American soldier. He graduated at West Point in 1845, served as aide-de-camp to Generals Hopping and Caleb Cushing during the Mexican War, and took an active part in the campaign against the Oregon Indians in 1856. He was appointed brigadier-general of volunteers in 1861, was severely wounded at Cedar Mountain (August 9, 1862), was promoted major-general in the same month, and subsequently commanded the departments of Washington (1863-66), of the Platte (1867-71), of Texas (1871-75), and of the Gulf (1875-78). In 1886 he retired from the military service.

AUGUR, HEZEKIAH (1791-1858). An American sculptor, born in New Haven, Conn. His best work was a statue of "Jephtha and His Daughter," now in the Trumbull Gallery of Yale University. The invention of a machine for carving wood gave him great fame.

AU′GURIES and **AUS′PICES.** These terms are familiar to every reader of Roman history, and are, besides, so frequently employed in English in a secondary and metaphorical sense, that a vague notion of their original meaning is caught up even by those who know nothing of classical antiquities. As, however, the entire religious and political life of the early Romans was deeply penetrated by the influence of their sacred superstitions, and, as among these, auguries and auspices held a prominent place, a clear conception of what they were is a matter of considerable moment. The following statements exhibit, in a condensed form, the substance of what is known on the subject.

Like most primitive nations, the Romans believed that every unusual occurrence had a supernatural significance, and contained, hidden in it, the will of Heaven regarding men. To reveal or interpret this hidden will, as relating to some definite matter, was the privilege of the *augur*, whose name is probably contracted from *avi*-ger (cf. *avis*, a bird), though the meaning of the second element is not clear. The *augur* must be distinguished from the *pontifex*, who directed the religious ritual; also from the *haruspex*, and other prophets, who predicted future events. It was the duty of the augur to determine whether the gods were propitious to a course of action already determined or in progress. Private augurs seem to have existed in the early days; but we are best informed about the public augurs—interpreters of Jupiter Optimus Maximus, as Cicero calls them. The origin of the *collegium augurium*, or 'college of augurs,' was lost in the myths of early Rome; but it is known that, by the Ogulnian law of B.C. 300, five of the nine public augurs must be plebeians, and it seems probable that the original number was three, representing the three early tribes. For more than 200 years, the number continued the same, till Sulla, in B.C. 81 increased it to 15. Until B.C. 103 the vacancies seem to have been filled by the college itself; but at that date a more complicated process was introduced, whereby the candidates were nominated by the college, and elected at an assembly of 17 tribes chosen by lot from the 35. Under the Empire this election was transferred to the Senate, but in general vacancies seem to have been filled by the mere recommendation of the Emperor. The last known augur, L. Ragonius Vetustus, is mentioned in an inscription of A.D. 390. The rank of the augurs was high, and the position was sought by the leading men of the State. It was held for life, and was not inconsistent with the holding of other religious and civil offices. The augurs were one of the four great priestly colleges ranking after the *pontifices*, but before the *decemviri* and *flamines*. They had special seats at the games and a regular income from public lands. The augurs solemnly *inaugurated* the new augurs and the flamines, and possibly other officials, inquired about 'the safety of the Roman people' at certain definite times, and consulted the gods regarding the harvest. In historic times, their most important function was taking the *auspices* in connection with almost any action of the State. This rapidly became a mere religious fiction, to be used to promote or prevent action, according to the wishes of the ruling powers.

Auguries might be of two kinds—(1) 'sought' (*impetrativa*), where the observer asked the gods for the sign desired; (2) *oblativa*, where they were unexpected. The modes of divination employed by the augurs were five in number: (1) *augurium ex cælo*; (2) *ex avibus*; (3) *ex tripudiis*; (4) *ex quadrupedibus*, and (5) *ex diris*. The first, relating to the interpretation of the celestial phenomena, such as thunder and lightning, was apparently of Etruscan origin, and held to be of supreme significance. The second related to the interpretation of the noise and flight of birds. It was not every bird, however, that could be a sure messenger of the gods. Generally speaking, those 'consulted,' as it was called, were the eagle, vulture, crow, raven, owl, and hen. The first two belonged to the class of *alites*, or birds whose flight revealed the will of the gods; the last four to the class of *oscines*, whose voice divulged the same. These two modes of augury were the oldest and most important, though the latter passed almost out of use in historic times. Of the other three, the auguries *ex tripudiis* were taken from the feeding of the sacred chickens; the auguries *ex quadrupedibus*, from four-footed animals within the limits of a 'temple' marked for the purpose; the auguries *ex diris* (a vague kind of augury), from any accidents or occurrences during the taking of the omens. These were usually unfavorable, and required the abandonment of the undertaking. Such *diræ* might also occur outside of the 'temple;' e.g. the stumblings of a general's horse, etc., and must be obeyed.

The ground on which the augur stood was solemnly set apart for the purpose, and was called a *templum*. The augur then took a wand, and marked out the heavens into four regions—*front, rear, right, left*. According as the signs appeared in either of these divisions were the auspices favorable or unfavorable. How vast the political influence and authority of the augurs must have been, is seen from the fact that almost nothing of any consequence could take place without their sanction and approval. The election of every important ruler, consul, dictator, or prætor, every civic officer, every religious functionary, was invalid if the auspices were unfavorable. No general could lawfully engage in battle unless the auspices were first taken, while the Comitia of the Centuries could be dispersed at a moment's notice by any member of the augural college on the ground of an unfavorable omen.

We have employed the two terms, auguries and auspices, as synonymous. But a slight difference is perceptible between them; not the augurs only, but the chief magistrates of Rome, held the 'auspices,' while the 'auguries' were exclusively in the possession of the former; but the mode of divination, and the end to be obtained by it, seem to have been the same in both cases, though in the field the method *ex tripudiis* was most common.

The power of taking the auspices in war was confined to the commander-in-chief, and any victory gained by a legate was said to be won under the auspices of his superior, and the latter alone was entitled to a triumph. Hence has originated the very common phrase in our language, 'under the auspices' of some one, which usually denotes nothing more than that the person alluded to merely lends the influence of his name. Consult: Bouché-Leclercq, *Histoire de la divination dans l'antiquité* (Paris, 1881-82); Wissowa, "Augures" and "Auspicium," in Pauly-Wissowa, *Realencyklopädie der klassischen Alterthumswissenschaft* (Stuttgart, 1896).

AU'GUST. See MONTH.

AUGUST, ou'gust, EMIL LEOPOLD (1772-1822). Duke of Saxe-Gotha and Altenburg. He succeeded his father, Ernst II., in 1804. He was a great patron of science and art, and founded the famous Chinese Cabinet in the Museum of Gotha. He wrote a series of songs and idyls entitled *Kyllenikon, oder Auch ich war in Arkadien* (1805).

AUGUST, FRIEDRICH WILHELM HEINRICH, Prince of Prussia (1779-1843). A general of infantry and inspector-general and chief of cavalry. He was born at Friedrichsfelde, and was a nephew of Frederick the Great. He rendered conspicuous services during the Napoleonic War, but was captured at Prenzlau and sent to France, where he was detained as a prisoner of war for 13 months. He fought in the battles of Dresden, Kulm, Leipzig, Montmirail, and Paris, and his famous brigade repeatedly decided the victory. As commander of an army corps, he captured most of the important fortresses on the northern frontier of France in 1815. He is said to have been deeply enamored of Mme. Récamier, whom he had met during his captivity in France at the house of Mme. de Staël, and whom he would have married but for political and religious reasons.

AUGUST WILHELM, vil'hĕlm, Prince of Prussia (1722-58). Founder of the present reigning line of the Hohenzollerns. He was born in Berlin, the second son of King Frederick William I., and a brother of Frederick the Great. Although a man of winning personality, he lacked the independence and decision of character of his elder brother. Appointed by Frederick (in 1757) commander of the Army of Kolin, he revealed such a lack of military ability in conducting the retreat from Bohemia that he was deprived of his command, whereupon he retired permanently to his castle at Oranienburg. The accusation brought by him against Frederick in the well-known *Relation über den Feldzug von 1757*, which at first proved so damaging to the reputation of the great commander, was disproved by the publication in 1887 of the *Politische Korrespondenz Friedrichs des Grossen*. As Frederick died without issue, he was succeeded by the son of August Wilhelm, who assumed the title of Frederick William II.

AUGUS'TA. See AGOSTA.

AUGUSTA. A city, and the county-seat of Richmond County, Ga., on the Savannah River, at the head of navigation, 231 miles from its mouth; latitude 33° 28′ north, longitude 81° 54′ west; 132 miles by rail northwest of Savannah; on several railroads, among them the Central of Georgia, the Charleston and West Carolina, the Georgia, the South Carolina and Georgia, and the Southern (Map: Georgia, E 2). The Augusta Canal, 9 miles long and 150 feet wide, starting above the city from a dam, furnishes the water supply, which is under municipal operation, and 14,000 horse-power for manufactures. Augusta is 150 feet above the sea, has a climate like that of Aiken, S. C., only 17 miles distant, somewhat cooler than Savannah, and an even temperature and dry air. It is an increasingly popular health resort. The city is finely laid out, with broad, beautifully shaded streets, intersecting at right angles. There are several parks,—one of them, May Park, containing 10¾ acres,—besides 25 squares, and outside the city are the cemetery and fair-grounds, attractively laid out. Summerville, on the Sand Hills, overlooking the city, and 400 feet above sea-level, is a suburb of handsome villas and cottages, and a well-known health resort. Augusta has a public library of 10,000 volumes; two handsome monuments—one erected in 1849 to the Georgia signers of the Declaration of Independence, the other to the Confederate soldiers; a Masonic Temple, Odd Fellows' Hall, and Cotton Exchange, besides many other notable private and public buildings. The chief educational institutions are the Georgia Medical College, a branch of the State University at Athens, Richmond Academy, Saint Mary's and Sacred Heart academies, Paine's Institute for Colored Students, and high schools for white and colored pupils. Among charitable institutions are the Orphan Asylum, Louise King Home, and hospitals for white and colored patients.

Augusta is one of the largest cotton markets in the South, and has important manufactures of cotton goods; iron foundries, sash, door, and blind factories, and other wood-working industries. Its lumber trade, and shipping of fruits and vegetables are extensive.

Under the charter of 1798, as revised in 1882, Augusta is governed by a mayor, elected for 3 years, and a city council, composed of the mayor and 15 councilmen, 3 from each ward, for a term of 3 years, one-third being elected each year. The mayor appoints the superintendents of canal and water-works, and of streets and drains; other offices, excepting the board of education, which is elected by the people, are in the hands of the council. Population, in 1860, 12,493; in 1880, 21,891; in 1890, 33,300; in 1900, 39,441. Founded under a charter by Oglethorpe in 1736, and named in honor of an English princess, Augusta was in its early years the most important trading station and one of the most important military posts in Georgia. Many notable conferences were held here with the Cherokees, Creeks, and Choctaws, large tracts of territory being secured at those of 1763 and 1773. Late in January, 1779, it was captured by the British and held for a month. In May, 1780, it was again captured, and was occupied by British and Loyalists until June 5, 1781, when, after a protracted siege, it was surrendered to Gen. Andrew Pickens and Col. Henry Lee. In 1778 it served as the capital, and though the legislature was frequently forced to meet elsewhere, it continued to be the nominal seat of government until 1798. It was incorporated as a town in 1798, and in 1817 was chartered as a city. Consult Jones and Dutcher, *Memorial History of Augusta* (Syracuse, N. Y., 1890).

AUGUSTA. The capital of Maine, and the county-seat of Kennebec County. It is situated mainly on the west bank of the Kennebec River, 45 miles from its mouth, 74 miles southwest of Bangor, and 170 miles from Boston (Map: Maine, D 7). Augusta is on the Maine Central Railroad, and has connection by steamer with Portland, Boston, and other important cities. It has excellent water-power, the Kennebec Dam, 17 feet high and nearly 600 feet long, being but a half-mile above the city. The most extensive products are lumber, cotton goods, pulp, and paper. Augusta is built on ground rising considerably above the river-level, and contains several imposing buildings—the State House, built of granite, and affording a beautiful view from its dome; the City Hall, Post-office, State Insane Asylum, and United States Arsenal. The city has also a soldiers' monument and two libraries—the Lithgow Library (public), of 8000 volumes, and the State Library, of 60,000 volumes, located in the Capitol. The administration is vested in a mayor and a bicameral city council, with the usual subordinate officials. Population, in 1880, 8665; in 1890, 10,527; in

1900, 11,683. Though trading stations had been established here very early, the permanent settlement dates from 1754, when the Plymouth Company built here a fort, called Fort Western. Settlers began to come in 1762, and the place was known as Cushnoc (from the Indian village formerly situated there) until 1771, when it was incorporated as Hallowell. Out of part of Hallowell a new town was created in 1797 and called at first Harrington, and then, several months later, Augusta. It became the capital of the State in 1831, and was incorporated as a city in 1849. Consult North, *History of Augusta* (Augusta, 1870).

AUGUSTA (Lat. fem. of *Augustus*, majestic, venerable). An honorary name bestowed upon women of the Roman Emperor's household as their greatest possible distinction. Livia was the first to receive it. It was sometimes even given to the Emperor's concubines. See CONSTANTINE; AUGUSTUS.

AUGUSTA, *Ger. pron.* ou-gụs'tȧ (Fem. of *Augustus*, venerable), MARIE LUISE KATHARINA (1811-90). Queen of Prussia and German Empress, the daughter of Charles Frederick, Grand Duke of Saxe Weimar. She was brought up at the court of her grandfather, Charles Augustus, where she was intimately acquainted with Goethe. On June 11, 1829, she married William, Crown Prince of Prussia, afterwards the Emperor William I. She was admired for her culture and beloved for her benevolence.

AU'GUSTA'LIA. Games in honor of Augustus, held on August 1, September 23 (the birthday of Augustus), and October 3-12.

AU'GUSTA'NA COL'LEGE AND THE'OLOG'ICAL SEM'INARY. Founded at Chicago, in 1860, by the Swedish Augustana Synod of the Lutheran Church. It removed to Paxton, Ill., in 1863, and to Rock Island in 1875. The institution is co-educational except in the theological department. The library contains 18,000 volumes. The number of students, distributed among the various departments is as follows: Theological 69, collegiate 126, academic 79, normal 33, business 178, and music and art 214. President (acting), C. W. Foss, Ph.D.

AUGUS'TAN AGE. The period of highest literary activity in Rome, under the patronage of Augustus and his adviser Mæcenas. At that time the Latin language was in its perfection, and men of letters were held in the highest honor. It was the period of Vergil, Horace, and Ovid. [See Sellar, *Roman Poets of the Augustan Age* (Oxford, 1886).] The term 'Augustan Age' is also extended to apply to other periods of literary brilliancy, as the age of Addison, Swift, and Steele, in England, and Louis XIV.'s reign in France.

AUGUSTAN BAND, THE. See AUGUSTUS'S BAND.

AUGUSTAN HIS'TORY (Lat. *Historia Augusta*). The usual title of a collection of biographies of Roman emperors and usurpers from Hadrian to Numerianus (A.D. 117-284), written by six authors, late in the Third or early in the Fourth Century. The memoirs are important for matters of fact, but the literary character is poor. A great deal of curious anecdote and much unauthenticated scandal are collected in these lives. Best edition by H. Peter (Leipzig, 1884); an old translation by Bernard (London, 1740).

AUGUSTA TAU'RINO'RUM. Anciently, the capital of the Ligurian Taurini; the modern Turin.

AUGUSTA TREV'IRO'RUM. The modern Treves (Ger. Trier); in ancient times the capital of the Treviri.

AUGUSTA VINDEL'ICO'RUM. The name bestowed by Augustus upon the chief seat of the Vindelici; the modern Augsburg.

AUGUSTE, ou-gụs'te, **VICTORIA** (1858—). German Empress and Queen of Prussia. She was born at the castle of Dolzig, the eldest daughter of Frederick, Duke of Schleswig-Holstein-Sonderburg-Augustenburg, and of Princess Adelheid of Hohenlohe-Langenburg. She was married to Prince William of Prussia—afterwards William II. of Germany—February 27, 1881. She is a patroness of many charitable enterprises, and has published a book entitled *Erinnerungsblätter an die Palästinafahrt* (1898), which contains a record of her memorable journey through Palestine in company with Emperor William in 1898.

AU'GUSTINE—often called AUSTIN—SAINT (?-604). First archbishop of Canterbury. He was originally a monk in the convent of Saint Andrew at Rome, and became its prior. In 596 he was sent, along with other monks, by Pope Gregory I., to convert the Anglo-Saxons to Christianity, and establish the authority of the Roman see in Britain. They got as far as Aix in Provence, and there, terrified by the reports they heard about the wildness of the Britons, desired to turn back, and dispatched Augustine to Rome for permission to do so; but Gregory sent him with a firm but kindly letter to rejoin his company, and ordered them to continue on their journey. At the same time he wrote to the Frankish clergy and rulers to share in the enterprise. So, in the spring of 597, Augustine and about forty companions, including Franks, landed on the Island of Thanet, in the extreme southeast of England, but at which point is uncertain. The missionaries were kindly received by Ethelbert, King of Kent, whose wife, Bertha, daughter of Charibert, King of Paris, was a Christian, and had Liudhard, Bishop of Senlis, in her suite as chaplain. A residence was assigned to them at Canterbury, then called Durovernum, where they devoted themselves to monastic exercises and preaching. The conversion and baptism (Whitsunday, June 2, 597) of the King contributed greatly to the success of their efforts among his subjects. There is abundant testimony to the fact that a marked improvement in the life and manners of the Anglo-Saxons followed the evangelistic labors of Augustine and his companions.

In 597 he went to Arles, by direction of the Pope, and was there consecrated Archbishop of Canterbury and Metropolitan of England. On his return, he dispatched a presbyter and a monk to Rome to inform the Pope of his success, and obtain instruction on certain questions. Gregory's directions with regard to the propagation of the faith are admirable. Thus, instead of destroying the heathen temples, Augustine was recommended to convert them into Christian churches, by washing the walls with holy water, erecting altars, and substituting holy relics and symbols for the images of the heathen gods.

Augustine's subsequent efforts to establish his authority over the native British Church were not so successful as his missionary labors, owing apparently to his lack of tact. He died in Canterbury, May 26, 604. His body was removed to the Cathedral of Canterbury in 1091. Bede's *Historia Ecclesiastica Gentis Anglorum* is the great authority for the life of Saint Augustine. Consult all the documents, in Latin and English, in A. J. Mason, *The Mission of Saint Augustine to England* (Cambridge, 1897). The celebration of the 1300th anniversary of Augustine's landing brought out in London in 1897 several volumes upon him—e.g. by E. W. Benson, Father Brou, S.J., G. F. Browne, W. E. Collins. Consult also, J. A. Cooke, *Early Churches in Great Britain Prior to the Coming of Augustine* (London, 1897).

The site and remains of Saint Augustine's monastery were purchased in 1844 by Mr. Beresford Hope, by whom they were presented to the Archbishop of Canterbury in trust, for the erection of Saint Augustine's Missionary College, at Canterbury, in connection with the Church of England. This institution was incorporated by royal charter in 1848.

AUGUSTINE, Saint (Lat. *Aurelius Augustinus*) (354-430). Bishop of Hippo, in North Africa, the greatest of the Latin Fathers, and one of the most eminent doctors of the Western Church. He is called Aurelius Augustinus by Orosius and Prosper of Aquitania. From his autobiographical *Confessions*, and from the biography written by his friend Possidius, we gather the most important facts of his life. He was born in Tagaste, a town in Numidia, November 13, 354, and died in Hippo, August 28, 430, during the siege of that town by the Vandals. His father, Patricius, was a pagan (afterwards converted), but his mother Monica, was a devoted Christian, who labored long and earnestly for her son's conversion, and who has been canonized by the Church. Augustine was brought up to be a rhetorician, and studied at Tagaste, Madaura, and Carthage. From about the age of 16 until shortly before his conversion, he lived in concubinage, which, along with other youthful irregularities, he afterwards bitterly lamented (cf. his *Confessions*, Book III.). One of the greatest obstacles to his conversion was this state of concubinage, against whose bondage he struggled for a long time in vain; he seemed to be sincerely and deeply attached to the object of his passion, to whom he was faithful for many years. By her he had one son, whom he named Adeodatus ('the gift of God').

The perusal of Cicero's *Hortensius* awakened Augustine to a more serious view of life, and he became an earnest seeker after truth, but experimented with several systems before finally entering the Christian Church. For nine years he was a follower of Manichæism (q.v.), a Persian dualistic philosophy then widely current in the Western Empire. With its fundamental principle of conflict between two opposing world-powers, symbolized by light and darkness, good and evil, Manichæism seemed to Augustine to correspond to the facts of experience, and to furnish the most plausible hypothesis upon which to construct a philosophical and ethical system. Moreover, its demands upon novices (*auditores*) were not strict enough to cause great uneasiness of conscience; witness Augustine's petition recorded in his *Confessions* (viii. 17), "Lord, make me pure and chaste—but not quite yet!" He never advanced to full membership, not becoming one of the *perfecti*. After nine years he abandoned this system, failing after diligent inquiry to find in it the solution of his greatest difficulties. His next stage of development was skepticism.

About this time (A.D. 383) Augustine left Carthage for Rome. His mother, almost heartbroken at his secret flight, took ship and followed. He did not remain long in the capital, but went on to Milan, where he fell under the influence of the Neo-Platonic philosophy, which has so often carried serious thinkers over from doubt to faith, and where he also met the great Bishop Ambrose, who at that time was the most distinguished ecclesiastic in Italy. Augustine presently found himself attracted once more toward Christianity, and asking what answer it had to give to the problems of life. In obedience to what seemed to him the direct call of God, he turned to the Scriptures and read the words, "Put ye on the Lord Jesus Christ, and make not provision for the flesh, to fulfil the lusts thereof" (Rom. xiii. 14). This decided the question. Augustine resolved to embrace Christianity and to believe as the Church believed. With his natural son he was baptized by Ambrose on Easter Eve, 387. His mother, who had rejoined him in Italy, was rejoiced at this answer to her prayers and hopes. She died soon afterwards at Ostia.

The remaining 43 years of Augustine's life were devoted to the service of the Church. He returned to Africa, was made presbyter in 391, and bishop of Hippo in 395, which latter office he held until his death. It was a period of political and theological unrest, for, while the barbarians pressed in upon the Empire, even sacking Rome itself, schism and heresy also threatened the Church. Augustine threw himself into the theological conflict, not from inclination, but from a sense of duty. With voice and pen he waged war, and usually he conquered. The whole of Western Christendom has entered into the fruits of his victories. Beside the Manichæan controversy, Augustine was engaged in two great theological conflicts. One was with the Donatists (q.v.), a numerous but schismatic body, and related chiefly to questions of Church discipline and order. It also involved a certain puritan theory of the Church and her ministry which Augustine did not share. In the course of this discussion he developed his ecclesiastical and sacramental theories. The other was with the Pelagians, followers of a British monk who disliked the idea of absolute predestination, and related to such doctrinal questions as man's primitive state, the fall, depravity, and so on. In the course of this conflict, which was long and bitter, Augustine developed his theories of sin and grace, of divine sovereignty and predestination. The Roman Catholic Church has found especial satisfaction in Augustine's teaching respecting the Church and its sacraments, while Protestants have sought authority for their characteristic doctrines in his anthropology and soteriology.

He taught that the true Church was characterized by four qualities—unity, holiness, catholicity, and apostolicity. Outside this Church there could be no salvation. It alone was the 'ark of safety' in which a perishing world must take refuge through submission to its authority. Convinced of the indispensable necessity of church membership, Augustine finally came to believe it right to coerce the intractable; it was the duty of the Christian State to 'compel them to come in.' This force-doctrine, so repellent to our modern ideas, and so fraught with evil in the history of religion, may be found clearly stated by Augustine in his Ninety-third Epistle (A.D. 408), where he cites the Parable of the Wedding-Feast in support of his position, and also in the proceedings of the Synod of Carthage, held in the year 411, which is commonly said to have ended the Donatist schism. Augustine's doctrine stood between the extremes of Pelagianism and Manichæism. Against Pelagian naturalism he held that death came into the world as the result of sin, and that man is saved by divine grace; against Manichæism he vigorously defended free-will. A misunderstanding of his position on grace and free-will often arises from neglecting to consider that he is at the same time an ardent defender of human freedom against Manichæan fatalism, and the champion of divine grace against the theory of complete human independence.

Augustine was an energetic controversialist, as we have seen. He was also a powerful preacher; but his sermons, owing partly to the great difference between their style and method and that to which we are accustomed, and partly to their fanciful interpretation of Scripture, often disappoint the modern reader. The editors have accepted 363 sermons as genuine, among a much larger number which bear his name. In his great apologetic work, the *City of God*, Augustine appeared in the rôle of seer, unfolding the meaning of the past and the secrets of the future with abundant learning and marvelous fertility of imagination. Ten of the 22 books into which this long work is divided are devoted to refuting the pagan notion that the worship of the gods insures prosperity in this life or in the life to come. The remaining 12 trace the origin, progress, and destiny of the two cities, one of God, the other of this world, with the final triumph of the former, which is the Christian Church. Thirteen years of Augustine's busy life (413-426) were occupied with this sublime attempt to construct a Christian philosophy of history. In 428, shortly before his death, Augustine wrote the *Retractions*, in which he registers his final verdict upon the books he had previously written, correcting whatever his maturer judgment held to be misleading or wrong.

The *Confessions* were written in 397; the *Epistles*, of which there are 270 in the Benedictine edition, are variously dated between 386 and 429. Among other important works may be noted his treatise *On Free-Will* (388-395); *On Christian Doctrine* (397); *On Baptism: Against the Donatists* (400); *On the Trinity* (400-416); *On Nature and Grace* (415); and *Homilies* upon several books of the Bible. The Benedictine edition of Augustine's works is still authoritative (Paris, 1679-1700, 11 vols., reprinted in Migne's *Patrologia Latina*, and elsewhere); but it is safe to predict that the standard edition will be that now in process of publication under the auspices of the Vienna Academy (in the *Corpus Scriptorum Ecclesiasticorum Latinorum*), of which eight volumes had appeared in 1900. The most important of Augustine's works may be read in English in the *Nicene and Post-Nicene Fathers*, first series, edited by Philip Schaff (New York, 1886-88, 8 vols.). Separate translations of the *Confessions* are numerous, e.g. by W. G. T. Shedd (Andover, 1860), and Charles Bigg (London, 1900). F. R. M. Hitchcock, *Saint Augustine's Treatise on the City of God* (London, 1900), is a convenient abstract of the complete work. Consult: "Augustine," in Smith and Wace, *Dictionary of Christian Biography* (London, 1887); Farrar, *Lives of the Fathers*, Vol. II. (Edinburgh, 1889); Harnack, *History of Dogma*, English translation by Neil Buchanan, Vol. V. (London, 1898); Cunningham, *Saint Austin and His Place in the History of Christian Thought* (London, 1885); and Harnack, *Augustine's Confessions*, English translation (London, 1901). For an unfavorable view of Augustine, see A. V. G. Allen, *Continuity of Christian Thought* (Boston, 1894).

AU'GUSTIN'IANS, or **AU'GUSTINES.** The name given to several religious bodies in the Roman Catholic Church. Although Saint Augustine never framed any formal rule of monastic life, one was deduced from sermons attributed to him, and was adopted by as many as 30 monastic fraternities, of which the chief were the Canons Regular, the Knights Templar (see TEMPLARS, KNIGHTS), the Begging Hermits, the Friar Preachers or Dominicans (q.v.), and the Premonstratensians (q.v.). The *Canons Regular of Saint Augustine*, or *Austin Canons*, appear to have been founded or remodeled about the middle of the Eleventh Century. Their discipline was less severe than that of monks, but more rigid than that of the secular or parochial clergy. They lived together, having a common refectory. Their habit was a long cassock, with a white rochet over it, all covered by a black cloak or hood, whence they were often called Black Canons. In England, where they were established early in the Twelfth Century, they had about 170 houses at the time of Henry VIII.'s dissolution of the monasteries, the earliest, it would seem, being at Nostell, near Pontefract, in Yorkshire. In Scotland they had about 25 houses; the earliest, at Scone, was founded in 1114, and filled by canons from Nostell; the others of most note were at Inchcolm, in the Firth of Forth, Saint Andrews, Holyrood, Cambuskenneth, and Inchaffray. In Ireland they had 223 monasteries and 33 nunneries.

The *Begging Hermits, Hermits of Saint Augustine*, or *Austin Friars*, were a much more austere order, renouncing all property, and vowing to live by the voluntary alms of the faithful. They are believed to have sprung from certain societies of recluses who, in the Eleventh and Twelfth centuries, existed especially in Italy without any regulative constitution. At the instigation, as is alleged, of the rival fraternities of Dominicans and Franciscans, Pope Innocent IV., about the middle of the Thirteenth Century, imposed on them the rule of Saint Augustine, whom they claimed as their founder. In 1256 Pope Alexander IV. placed them under the control of a superior or president, called a 'general.' In 1287, a code of rules or constitutions was compiled, by which the Order long continued to be governed. About 1570, Friar Thomas of Jesus, a Portuguese brother of the Order, introduced a more austere rule, the disciples of which were forbidden to wear shoes, whence they were called *discalceati*, or 'barefooted friars.' At the time of the dissolution of the monasteries of Henry VIII., they had 32 houses in England. Now there is one, and there are 12 in Scotland. There are 16 convents and houses in the United States.

The degeneracy of the Order in the Fourteenth Century called into existence new or reformed Augustinian societies, among which was that Saxon one to which Luther belonged. After Luther had abandoned the Order, and entered upon his course of opposition to the Catholic Church, he did not spare his denunciations of his former brethren. After the French Revolution the Order was wholly suppressed in France, Spain, and Portugal, and partly in Italy and southern Germany. It has diminished even in Austria and Naples, but is still powerful in America.

The name of Augustinians was given also to an order of nuns who claimed descent from a convent founded by Saint Augustine at Hippo, of which his sister was the first abbess. They were vowed to the care of the sick and the service of hospitals. For the English Augustinians consult: Clark, *Customs of the Augustinian Canons* (Cambridge, Eng., 1897); *Augustinian Priories of Saint Giles and Saint Andrew at Barnwell, Cambridgeshire, Observances There* (London, 1897).

AUGUSTOWO, ou′gụs-tȯ′vȯ, or **AUGUSTOW.** A town of Russian Poland, in the Government of Suwalki, capital of a circle of the same name, on the Netta, a feeder of the Bug, 138 miles northeast of Warsaw (Map: Russia, B 4). It was founded by Sigismund Augustus, King of Poland, in 1557. It has fisheries, lumber interests, and some trade in horses and cattle. Population, in 1885, 10,300; in 1897, 12,700.

AUGUS′TULUS, ROMULUS. The last Emperor of the western portion of the Roman Empire. His name was Augustus, but the diminutive title under which he is universally known was given him by the Romans on account of the essential pettiness of his character. He was the son of Orestes, a Pannonian of birth and wealth, who rose to high rank under the Emperor Julius Nepos, whose favor he repaid by stirring up the barbarian troops in the pay of Rome to mutiny against him. On the flight of the Emperor, Orestes conferred the vacant throne on his son, Augustulus (A.D. 476), retaining all substantial power in his own hands. Orestes, failing to conciliate the barbarians, who had helped him against Nepos, with a grant of the third of the lands of Italy, was besieged in Pavia by a large force under the command of Odoacer (q.v), and on the capture of the town was put to death. Augustulus yielded at once, and being of too little consequence to be put to death, he was dismissed to a villa near Naples, with an annual pension of 6000 gold *solidi*. His after-fate is unknown.

AUGUS′TUS (by birth GAIUS OCTAVIUS; after his adoption by Cæsar, GAIUS JULIUS CÆSAR OCTAVIANUS; by decree of the Senate, in B.C. 27, AUGUSTUS) (B.C. 63 - A.D. 14). The first Roman Emperor. He was the son of Octavius and Attia (daughter of Julia, the youngest sister of Julius Cæsar). He was born September 23, B.C 63. The Octavian family came originally from Velitræ, in the country of the Volsci, and the branch from which Augustus descended was rich and honorable. His father had risen to the rank of senator and prætor, but died in the prime of life, when Augustus was only four years old. Augustus was carefully educated in Rome under the guardianship of his mother and his stepfather, Lucius Marcius Philippus. At the age of 12 Augustus delivered a funeral oration over his grandmother; at 16 he received the *toga virilis*. The talents of the youth recommended him to his grand-uncle, Julius Cæsar, who adopted Augustus as his son and heir in B.C. 45. At the time of Cæsar's assassination (March 15, B.C. 44), Augustus was a student under the celebrated orator Apollodorus, at Apollonia, in Illyricum, where, however, he had been sent chiefly with a view to gain practical instruction in military affairs. He returned to Italy, and at his landing at Brundisium, was welcomed by deputies from the veterans there assembled; but, declining their offers, he chose to enter Rome privately. The city was at this time divided between the two parties of the Republicans and the friends of Marcus Antonius; but the latter had, by adroit manœuvres, gained the ascendancy, and enjoyed almost absolute power. Augustus was at first haughtily treated by the consul, who refused to surrender the property of Cæsar. After some fighting (Mutinensian War), which ended in the defeat of Antonius by the forces of the Senate, and his flight across the Alps, Augustus, who had made himself a favorite with the people and the army, succeeded in getting the will of Julius Cæsar carried out. He found an able friend and advocate in Cicero, who had at first regarded him with contempt. The great orator, while imagining that he was laboring in behalf of the Republic, was in fact only an instrument for raising Augustus to supreme power. When Antonius returned from Gaul with Lepidus, Augustus joined them in establishing a triumvirate. He obtained Africa, Sardinia, and Sicily; Antonius, Gaul; and Lepidus, Spain. Their power was soon made absolute by the massacre of those unfriendly to them in Italy, and by the victories over the Republican army, commanded by Brutus and Cassius. After the battle of Philippi, won by Augustus and Antonius, of which the former unjustly claimed all the credit, whereas it mainly belonged to the latter, the triumvirs made a new division of the provinces—Augustus obtaining Italy, and Lepidus, Africa. The Perusian War, excited by Fulvia, wife of Antonius, seemed likely to lead to a contest between Augustus and his rival, but was ended by the death of Fulvia, and the subsequent marriage of Antonius with Octavia, sister of Augustus. Shortly afterwards, the claims of Sextus Pompeius and Lepidus having been settled by force and fraud, the Roman world was divided between Augustus and Antonius, and a contest for supremacy began between them. While Antonius was lost in luxurious dissipation at the court of Cleopatra, Augustus was industriously striving to gain the love and confidence of the Roman people, and to damage his rival in public estimation. At length war was declared against the Queen of Egypt, and at the naval battle of Actium (q.v.), B.C. 31, Augustus was victorious, and became sole ruler of the whole Roman world. Soon afterwards Antonius and Cleopatra ended their lives by suicide. The son of Antonius, by Fulvia, and Cæsarion, son of

Cæsar and Cleopatra, were put to death; and in B.C. 29, after disposing of several affairs in Egypt (which had now become part of the Roman Empire), Greece, Syria, and Asia Minor, Augustus returned to Rome in triumph, and, closing the temple of Janus, proclaimed universal peace.

His subsequent measures were mild and prudent. To insure popular favor, he abolished the laws of the triumvirate, adorned the city of Rome, and reformed many abuses. At the end of his seventh consulship (B.C. 27), he proposed to retire from office, in order that the old republican form of government might be reëstablished, but he was ultimately induced to retain his power. Hitherto, since Cæsar's death, the consul had been named Octavian; but now the title of *Augustus* (meaning sacred or consecrated) was conferred on him. In the eleventh consulship of Augustus (B.C. 23), the tribunitian power was conferred on him for life by the Senate. Republican names and forms still remained, but they were mere shadows. Augustus was in all but name absolute monarch. In B.C. 12, after the death of Lepidus, he had the high title of Pontifex Maximus, or high-priest, bestowed on him. The nation surrendered to him all the power and honor that it had to give.

After a course of victories in Asia, Spain, Pannonia, Dalmatia, Gaul, etc., Augustus (A.D. 9) suffered the greatest defeat he had sustained in the course of his long rule, in the person of Quintilius Varus, whose army was totally destroyed by the Germans. (See ARMINIUS.) This loss so afflicted Augustus that for some time he allowed his beard and hair to grow as a sign of deep mourning, and often exclaimed: "O Varus, restore to me my legions!" From this time Augustus confined himself to plans of domestic improvement and reform, and so beautified Rome that it was said, "Augustus found the city built of brick, and left it built of marble." He also founded cities in several parts of the Empire, and altars were raised by the grateful people to commemorate his beneficence; while, by a decree of the Senate, the name Augustus was given to the month Sextilis. Agrippa and Mæcenas were his friends and counselors.

Though surrounded thus with honor and prosperity, Augustus was not free from domestic trouble. The abandoned conduct of his daughter Julia was the cause of sore vexation to him. He had no son, and Marcellus, the son of his sister, and Gaius and Lucius, the sons of his daughter, whom he had appointed as his successors and heirs, as well as his favorite stepson Drusus, all died early; while his stepson Tiberius, the son of Livia, was an unamiable character, whom he could not love. Age, domestic sorrows, and failing health warned him to seek rest, and to recruit his strength he undertook a journey to Campania, but his infirmity increased and he died at Nola (August 19, A.D. 14), in the 77th year of his age. According to tradition, shortly before his death he called for a mirror, arranged his hair neatly, and said to his attendants: "Have I played my part well? If so, applaud me!" Augustus had consummate tact and address as a ruler and politician, and could keep his plans in secrecy while he made use of the passions and talents of others to forward his own designs. The good and great measures which marked his reign were originated mostly by Augustus himself. He encouraged agriculture, patronized the arts and literature, and was himself an author: but only a few fragments of his writings have been preserved. Horace, Vergil, and other celebrated poets and scholars were his friends. His was the Augustan Age of literature. His death threw a shade of sorrow over the whole Roman world; the bereaved people erected temples and altars to his memory, and numbered him among the gods. Consult: Gardthausen, *Augustus und seine Zeit* (Leipzig, 1891); Beulé, *Auguste, sa famille et ses amis* (Paris, 1867); and Boissier, *La religion romaine*, Vol. I. (Paris, 1883).

AUGUSTUS, APOTHEOSIS OF. A famous cameo in the Cabinet des Medailles et Antiques at Paris. It is cut on a sardonyx, measuring nearly a foot in height, and is the largest cameo known. It contains twenty-six figures of great Romans, and formerly was thought to represent a triumphal procession of Joseph in Egypt.

AUGUSTUS, ARCH OF. A triumphal arch with three openings, erected in honor of Augustus on the Roman Forum in B.C. 29, in commemoration of his victories in Dalmatia, in Egypt, and at Actium. It was destroyed by workmen about 1540, the foundations alone being discovered in 1888 between the temples of Cæsar and of Castor and Pollux.

AUGUSTUS, FORUM OF. The second of the imperial fora at Rome; founded by Augustus. It was surrounded by massive walls and colonnades, and was adorned with statues of distinguished men of the Republic. In the centre of the forum stood the temple of Mars Ultor, commemorating the battle of Philippi, and dedicated B.C. 2. An entrance arch and portions of the walls and of the temple still remain.

AUGUSTUS, MAUSOLEUM OF. An imposing circular structure of white marble, 280 feet in diameter, erected by Augustus in B.C. 27 in the Campus Martius at Rome. It was surmounted by a cone of earth covered with trees. On the sides of the entrance, on the south, stood two obelisks, now in the Piazza del' Esquilino and the Piazza del Quirinale, copies of decrees in honor of those interred in the mausoleum, and the Res Gestæ of Augustus. The first burial in the vaults was that of the young Marcellus in B.C. 28, the last that of Nerva in A.D. 98. During the Middle Ages the cone of earth was removed, and the top transformed into a hanging garden. The structure was later used as a stronghold, a bull-ring, and a circus. The brick shell is still visible.

AUGUSTUS, RES GESTÆ (exploits) OF. A very important document for the history of Rome prepared by the Emperor Augustus in the latter part of his life, and engraved on bronze tablets placed on columns flanking the entrance of his mausoleum. It gives the autobiography of the Emperor and forms his political testament. The document is known from numerous copies, and is frequently quoted by Roman writers.

AUGUSTUS (1526-86). Elector of Saxony, the son of Duke Henry the Pious, and of Katherine of Mecklenburg. He was born at Freiburg, then the seat of his father's court. While still a youth, he spent some time at Prague, and there formed an intimate friendship with Maximilian, afterwards Emperor Maximilian II. of Germany.

In 1548, he married Anna, daughter of Christian III. of Denmark, who was universally popular on account of her devoted adherence to Lutheranism and her fine character. After the death of his brother Maurice, in 1553, Augustus succeeded to the electorate. His rule is chiefly noticeable as bearing upon the history of the newly established Protestant Church. In 1555 he was instrumental in bringing about the Peace of Augsburg. Augustus first used his utmost influence in favor of the Calvinistic doctrine; but later he adopted the Lutheran tenets, and persecuted the Calvinists. By his skillful internal administration, he raised his country far above the level of any other in Germany, introducing valuable reforms both in jurisprudence and finance, and giving a decided impetus to education, agriculture, manufactures, and commerce. He wrote a book on the management of orchards and gardens, and commanded that every newly-married pair should, within the first year of their marriage, plant two fruit trees. The Dresden Library owes its origin to him, as do also some of its collections. In January, 1586—the Electress having died the year previous—Augustus married a young princess of Anhalt, but died a month after. Consult Falke, *Geschichte des Kurfürsten August von Sachsen* (Leipzig, 1868).

AUGUSTUS I., Frederick (1670-1733). Elector of Saxony and King of Poland (as such styled Augustus II.), commonly called the Strong. He was the second son of the Elector John George III., and of the Danish princess, Anna Sophia, and was born at Dresden. In youth he traveled over a great part of Europe, and tasted the pleasures of the different courts. When, in 1694, he succeeded his brother George as Elector, instead of turning his arms against France, according to previous arrangement, he undertook the command of the Austro-Saxon army against the Turks in Hungary. After the battle of Olasch, in 1696, he returned to Vienna, and set himself up as a candidate for the throne of Poland, vacated by the death of John Sobieski. Bidding higher than Prince Conti for the crown (10,000,000 Polish florins), and adopting the Catholic faith, he was elected King by the nobles, and was crowned at Cracow, on September 15, 1697, as Augustus II. of Poland. On ascending the throne he promised to regain for his new kingdom the provinces that had been ceded to Sweden. He joined Peter the Great in his war against Charles XII., but his forces were repeatedly overthrown by the Swedes. The crown of Poland was wrested from him, and Stanislas Leszczynski was made King in his place. Augustus was forced to sign the ignominious Peace of Altranstädt in 1706, in which he abandoned his claims to the Polish throne. However, on receiving intelligence of the defeat of Charles XII. at Pultowa, in 1709, he declared the treaty of Altranstädt annulled, marched with a powerful army into Poland, of which he again became master, and renewed the war with Sweden, which continued till the death of Charles XII. at Frederikshald, in 1718, led first to a truce, and eventually to a peace with that kingdom. Meanwhile a confederation of Polish nobles had been formed against the Saxons, and fought against them with much success, till, in 1716, through the armed intervention of the Czar, a compact was made between the Poles and Augustus, by which the Saxon troops left the kingdom. The King now found himself obliged to employ conciliation, and the splendor of his dissolute court soon won the favor of the Polish nobles, who followed his example but too closely. Saxony had bitter cause to regret the union of the crowns. Its resources were shamefully squandered on the adornment of the capital, Dresden, on the King's mistresses, his illegitimate children, and the alchemists who deluded him with hopes of the elixir of life. Augustus supported the fine arts as ministering to luxury, but did little for the cause of science. Despotic in principle, though easy in temper; ambitious as well as luxurious; reckless alike in the pursuit of war and pleasure, death overtook him in the midst of projected festivities. On his way to the Warsaw Diet, gangrene of an old wound set in, and he died February 1, 1733, and was buried at Cracow. By his wife he left an only son, who succeeded him. The most celebrated of his numerous illegitimate offspring was Maurice of Saxony (Marshal Saxe). Consult Desroches de Parthénay, *Histoire de Pologne sous le roi Auguste* (Hague, 1733-34).

AUGUSTUS II., Frederick (1696-1763). Elector of Saxony and King of Poland (as such styled Augustus III.). He was the son and successor of Augustus the Strong. Though carefully educated by his mother in the Protestant faith, he adopted Catholicism in 1712 while on a journey through Italy. In this step he was probably influenced by his ambition for the crown of Poland. After succeeding his father in the electorate in 1733, he was chosen King of Poland by a part of the nobility. Aided by Russia and Austria, he triumphed over the rival claims of Stanislas Leszczynski, supported by Louis XV., and was unanimously proclaimed three years later as Augustus III. He left all the cares of government to his favorite, Brühl, who ruined Saxony to minister to the pleasures of his King. In 1742 Augustus joined Maria Theresa against Frederick of Prussia, but their armies were defeated in 1745, and Augustus had to flee from his capital. He made peace with Frederick and recovered Saxony. In the Seven Years' War, Augustus, as the ally of Austria, suffered the loss of his army at Pirna (1756); his country was overrun, his State papers fell into Frederick's hands, and he himself had to flee to Poland, where his popularity, never very great, was much diminished by his recent reverses in Saxony. After the Peace of Hubertsburg (February 10, 1763), Augustus returned to Dresden. He died October 5, 1763. His son, Frederick Christian, succeeded him in the electorate, and Stanislas Poniatowski became King of Poland. Augustus was a spendthrift, like his father, and spent immense fortunes in beautifying his capital, Dresden. Consult Ruthière, *Histoire de l'anarchie de Pologne* (Paris, 1819).

AUGUSTUS'S BAND—better termed the Augustan Band (Gk. *Σπεῖρα Σεβαστή, Speira Sebastē*, Lat. *Cohors Augusta*). One of the cohorts of provincial troops stationed in Syria during the Roman rule, designated Augusta as a title of honor. It did not belong to the legionary forces, which formed the heart of the imperial army, and consisted only of Roman citizens, but to the auxiliaries, which were recruited from the natives of the provinces in which they were stationed, and consisted of those who did not, generally speaking, possess citizen rights. From the reference in Acts xxvii. 1 ("They delivered Paul to a centurion named Julius of the Augustan band") it was evidently located in Cæsarea, which, after the deposition of Archelaus (A.D. 5), became the residence of the Procurator of Judea, incorporated at that time into the enlarged Province of Syria.

This band differed from the Italian band (Gk. Σπεῖρα Ἰταλική), mentioned, in Acts x. 1, as stationed at the same place, in that the latter was evidently composed of Roman volunteers who had been recruited in Italy, having been unable to secure service in the Prætorian Guard.

AUK, a̤k. A name applied collectively to a family of Arctic diving sea-birds (Alcidæ—the type in some classifications of a higher group, Alcoidea—many of which are more specifically known as guillemots, murres, lomvias, puffins, etc.). All belong in the north polar regions, taking the place of the Antarctic penguins, and they are particularly numerous upon the Alaskan and Siberian coasts. Some species, however, dwell considerably south of the Arctic Circle, or formerly did so. Their nearest relatives are the grebes and loons. They differ from the former by the presence of tail-feathers and lack of lobes upon the toes, and from the loons by the absence of a hind-toe. They are thickset, stout birds, only a few living species exceeding a foot in length; the legs are set so far back that the birds seem to stand on their tails, and are able to move about only with difficulty and awkwardly, while the feathers of the wings and tail are so short that flight is feeble and secondary to the use of the wings as paddles for swimming under water, where they progress with remarkable speed and endurance. The sea is their real home, where they obtain their food by diving and pursuing fishes; and their plumage, in adaptation to these conditions, is exceedingly dense and lustrous, and the skins are extensively utilized by the Eskimo in the making of light clothing. The colors are usually black, brown, or dark lead-color above, and white beneath, but in the nuptial season bright colors and a variety of ornamental crests, plumes, and appendages to the bill appear temporarily. The bill in the auks (especially the puffins) is exceedingly compressed, and often has a knife-like culmen, and deep, thin under-mandible. It is a popular belief that this shape is utilized as a thin wedge for opening clams and other bivalves; but this is an error, the bird swallowing whole the few small mollusks and crustaceans with which it varies its fish diet. An extraordinary feature of this extraordinary kind of beak is that, in the breeding season, among the puffin group of the family, the beak becomes largely increased in size, and various appendages may be added about its base, varying with the species, while it glows with bright colors; but as the season passes, and the semi-annual molt of feathers begins, these excrescences and the plates about the base scale off, and the gay colors disappear. (For details, see Stejneger, *Bulletin United States Nat. Museum*, No. 29, 1885, illustrated).

Auks migrate in autumn from their most northerly haunts and from all frozen coasts to the open spaces of sea, where they spend the winter afloat or on the drifting ice. With the opening of spring they resort in enormous numbers to the coasts of the northern oceans wherever rocky cliffs confront the sea; and they take possession of niches and ledges as breeding-places, sometimes in tens of thousands, each affectionate pair preëmpting and defending a little home-space. Only a single egg is laid, which is large for the size of the bird, conical in outline, and is constantly watched and warmed by the parents alternately. No nest whatever is made, but the egg is held upon the webbed feet and kept warm between the thighs. (Selous, *Bird Watching*, London, 1901). These eggs are marbled and blotched with a great variety of colors. Accounts differ as to how the young get down to the water, and it is probable that various methods of carrying are employed, while some seem simply to throw themselves or be tumbled off the ledge into the sea. Foxes and various animals raid these hosts wherever accessible, and the natives of the Arctic regions depend largely upon them for food, capturing both birds and eggs in great numbers, and preserving them for winter food. Similarly the eggs are considered an important resource of the non-civilized inhabitants of the Aleutian and Kamchatkan coasts, southern Greenland, and the Hebrides. Three species of the North Atlantic deserve particular mention:

The Great Auk, or Garefowl (*Plautus impennis*), which is now extinct, but within historic times was an inhabitant of the North Atlantic coasts as far south as the Hebrides and the Gulf of Newfoundland. It was as large as a goose, and black and white in colors. It is fully described under Extinct Animals, and Garefowl; and is illustrated on the plate of Auk, Albatross, etc.

The Little Auk (*Alca alle*) is the smallest of the tribe, not larger than a robin, black above and white beneath, and occurs in vast numbers throughout the Atlantic Arctic region, and southward in winter sometimes as far as New York and the Great Lakes. It is remarkable for having a bill more like that of a fowl than like that of its type. See Dovekie.

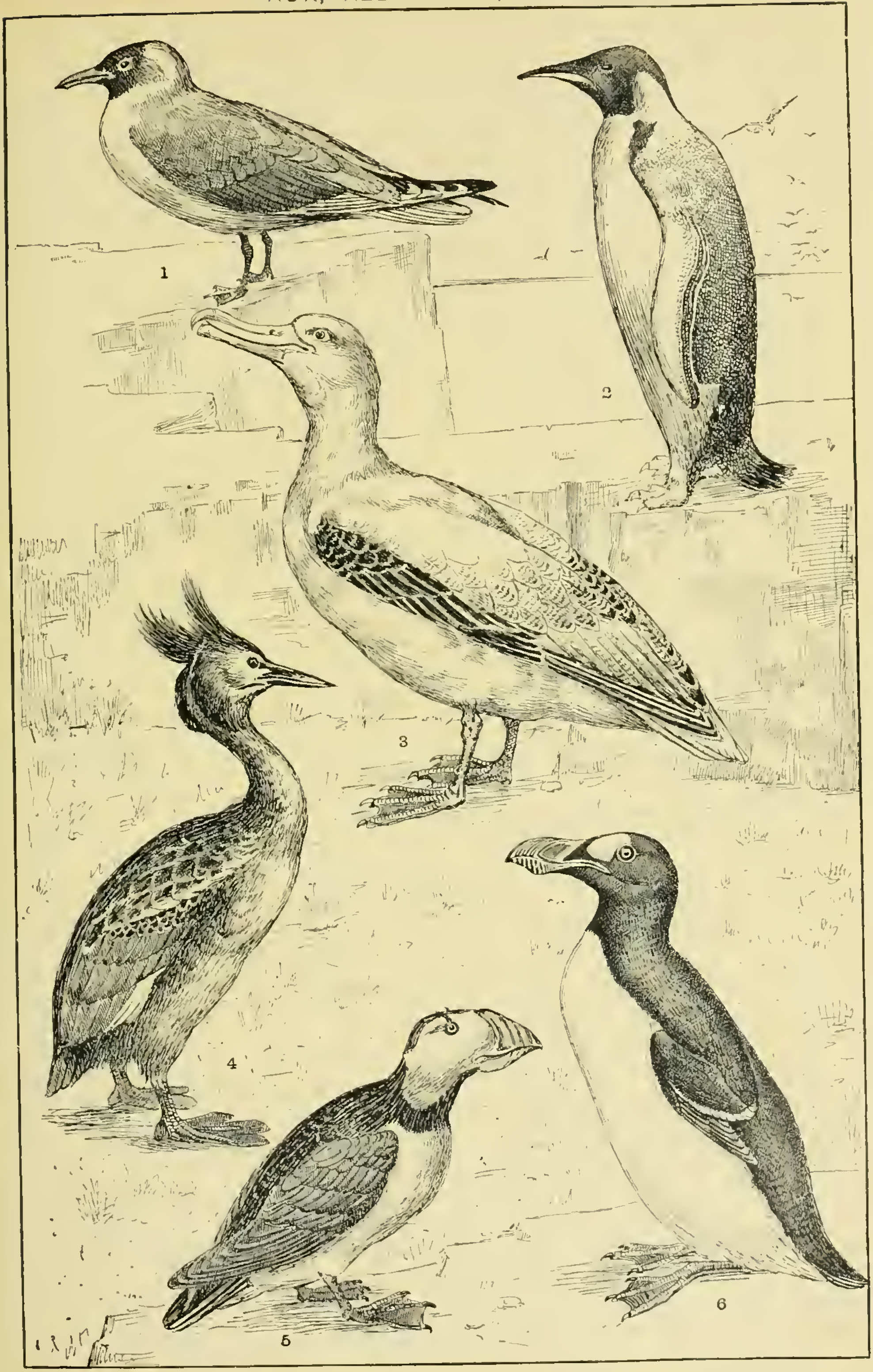
The Razor-billed Auk (*Alca torda*) is 15 to 18 inches in length, black and white (in summer head and neck snuff-brown, and a white wing-bar), has a bill of remarkable height and sharpness, and breeds as far south as the coast of Maine. See Razor-bill; Guillemot; and Puffin.

AULD LANG SYNE, a̤ld lăng sīn (Scotch, old long since). A Scottish song, traced to the year 1600. It was retouched by Burns, who added two stanzas, and was set by George Thomson to the old Lowland air, "I fee'd a lad at Michaelmas."

AULD REE'KIE. A name given by the Scotch to Edinburgh, from the fact that the air reeks with smoke and the streets with filth.

AULD ROB'IN GRAY. A pathetic ballad, published anonymously in 1772, by Lady Anne Barnard, who had written it two years before, in her twenty-first year, but who did not acknowledge it until two years before her death, in 1825. In a letter to Sir Walter Scott, Lady Anne explained that she was inspired to write it by a certain old Scottish tune, of which she was passionately fond, but in which the words

AUK, ALBATROSS, ETC.



1. BLACK-HEADED GULL (Larus ridibundus).
2. KING PENGUIN (Aptenodytes longirostris).
3. WANDERING ALBATROSS (Diomedea exulans).
4. CRESTED GREBE (Colymbus cristatus).
5. TUFTED PUFFIN (Lunda cirrhata).
6. GREAT AUK, OR GAREFOWL (Plautus impennis).

were hardly proper. She chose, therefore, a heroine of humble life, suitable to the plaintive air, and "oppressed her with many misfortunes." She afterwards wrote a sequel to the ballad, in which "Auld Robin" dies, Jamie returns from the sea, and the two lovers are happily united. The author's original purpose in writing it is said to have been to raise money for an old nurse.

AU′LIC COUN′CIL (Lat. *aulicus*, Gk. *αὐλικός*, *aulikos*, from Gk. *αὐλή*, *aulē*, hall court). One of the two highest courts of the Holy Roman Empire, coördinate with the Imperial Chamber. It was created in 1501 by Maximilian I., as a rival to the Imperial Chamber, which the Diet had forced upon him. It seems to have been at first employed principally in preparing business matters regarding the crown-lands and the Empire generally, in order to expedite the decisions of the Imperial Chamber. It soon, however, began to assume or acquire higher functions. Later, the States submitted important grievances to its independent consideration; but it did not receive a fixed constitution before 1559. At the Peace of Westphalia, 1648, its powers were greatly limited, but in 1654 it was formally recognized as the second of the two supreme courts, equal in dignity to the Imperial Chamber, and the highest court of appeals in the Empire. It was composed of a president, a vice-president, a vice-chancellor, and eighteen councilors, who were all chosen and paid by the Emperor, with the exception of the vice-chancellor, who was appointed by the Elector of Mainz. Of the eighteen councilors, six were Protestants, whose votes, when they were unanimous, were an effective veto, so that a religious parity was to some extent preserved. The councilors were divided into two classes, barons and counts, and jurists. The seat of the Aulic Council was at the Imperial residence, that is, at Vienna. The Council held aloof from politics, but under its jurisdiction were placed: (1) All matters concerning the reserved rights of the Emperor; (2) all questions of appeal on the part of the States from decisions in favor of the Emperor in minor courts; (3) whatever concerned the Imperial jurisdiction in Italy. On the death of the Emperor, the Council was dissolved, and had to be reconstructed by his successor. It ceased to exist on the extinction of the Holy Roman Empire in 1806. Consult Herschenhahn, *Geschichte des kaiserlichen Reichshofraths* (Mannheim, 1791-93).

AULICH, ou′lĭk, LUDWIG (1795-1849). A Hungarian general, born at Pressburg. Upon the outbreak of the Hungarian Revolution of 1848 he served as lieutenant-colonel in an Austrian infantry regiment, which afterwards swore allegiance to Hungary. As colonel of the regiment he fought against the Servians at Saint Tamás, allied with the Austrian army under Schwarzenberg. As general of the Second Hungarian Army Corps he contributed greatly to the victories achieved over Prince Windischgrätz, and was received in Pest as the hero of the day. Upon the resignation of Görgei he became minister of war, but was delivered over to Austria by the Russians upon the conclusion of peace, and was hanged with twelve other generals.

AU′LIS (Gk. *Αὐλίς*). Anciently, a small port in Bœotia, on the Euripus, famed for its temple of Artemis, but in itself a place of little importance. It was the traditional gathering place of the Greek fleet before the Trojan War, and was the scene of the sacrifice of Iphigenia (q.v.).

AULNAY DE CHARNISÉ, ô′nâ′ de shär′-nē′zā′. See CHARNISÉ.

AULNOY, or **AUNOY**, ô′nwä′, MARIE CATHERINE, Comtesse d' (1650-1705). A French author, chiefly remembered for her *Contes des fées*, popular fairy-tales (1698), in successful imitation of Perrault (q.v.). Many of the stories have been translated into English. She wrote also *Mémoires de la cour d'Espagne* (1690), and several novels, of which *Histoire d' Hippolyte, Comte de Douglas* (1690) is the best.

AULON. The Greek name for Avlona (q.v.), a port of Turkey.

AULOS. A Greek wind instrument similar to the clarinet and oboe (qq.v.).

AULYE-ATA, or **AULIE-ATA**, ou′lyâ ä′tâ. The chief town of a district, and fortress in the territory of Syr-Darya, Russian Turkestan. The town is picturesquely situated in a hilly region, 5700 feet above the sea, on the way from Tashkent to Verniy. Fruit-raising is the chief industry. Population, 12,000, including a considerable number of Russians.

AUMALE, ô′mâl′ (through *Aubmarle*, *aubemarle*, Eng. *Albemarle*, from Med. Lat. *Albamarla*, white marl, clay). A town in France, 40 miles northeast of Rouen. Here, in 1592, in a battle between the Spaniards and French, Henry of Navarre was wounded. Population, in 1891, 2219. Consult Semichon, *Histoire de la ville d'Aumale* (Paris, 1862). Aumale was the name of a county in the early part of the Sixteenth Century, belonging to Claude of Lorraine, son of René II. Claude was created Duc de Guise, and became the head of that famous house.

AUMALE, CHARLES DE LORRAINE, Duc d' (1556-1631). An ardent partisan of the League in the politico-religious wars which devastated France in the latter half of the Sixteenth Century. Closely allied to the Guises, he heartily supported them in their struggle, both against the Huguenots and the King. After the murder of the Duc de Guise at Blois, in 1588, he divided with the Duc de Mayenne the leadership of the League. He was defeated at Senlis by the Duc de Longueville, and shared in the disasters of Arques (1589) and Ivry (1590). He held out for the League in Amiens until the populace expelled him; when he suddenly allied himself with the Spaniards, who had invaded Picardy, refused the royal pardon, and delivered over to the enemy several places in his possession. For this he was impeached, condemned, and sentenced to be broken alive on the wheel (1595). His property was confiscated, but he himself escaped. He died in exile at Brussels.

AUMALE, CLAUDE I., DE LORRAINE, Duc d' (died 1550). The son of René II., Duc de Lorraine. For his bravery at the battle of Marignano, in 1515, and his loyalty after the disaster at Pavia, Francis I. made him Duc de Guise.

AUMALE, CLAUDE II., DE LORRAINE, Duc d' (1525-73). A son of Claude I. He was a bitter enemy of the Huguenots, and of their leader, Coligny. He acted as governor of Burgundy; fought at Metz, in 1552; was present with Guise at the taking of Calais, in 1558, and participated in the battles of Dreux, Saint Denis, and Montcontour, during the Civil War. He was killed at the siege of La Rochelle in 1573.

AUMALE, Henri Eugène-Philippe, Louis d'Orléans, Duc d' (1822-97). The fourth son of Louis Philippe, King of the French. He was born at Paris and was educated at the Collège Henri IV., where he showed a good deal of talent. When 16 years of age he entered the army, soon distinguished himself by his bravery, and passed rapidly through the various grades of rank. In 1843 he commanded a subdivision of the French Army in Algeria, and performed some brilliant exploits in his campaign against the famous Abd-el-Kader. In 1844 he directed the expedition against Biskra, and in 1847 succeeded Marshal Bugeaud as Governor-General of Algeria, in which capacity he received the surrender of Abd-el-Kader. After the Revolution of 1848 he resigned and withdrew to England, where he devoted himself to literature. On the outbreak of the Franco-German War, he was refused permission to serve in the French Army, but in February, 1871, was chosen a member of the Assembly by the electors of the Department of Oise, and in December took his seat, the members of his family having been allowed to return to France. In 1873 he was made general of division, and presided over the council of war that tried Marshal Bazaine. He subsequently held other military commands; but in 1886, on the passage of the Expulsion Bill, he was debarred from the army, and withdrew to England. Not long after this, it was learned that he had given the Château of Chantilly, with its magnificent collections, to the Institute of France, of which he had been a member in 1871, the Institute to hold the bequest in trust for the French nation. The decree of banishment was revoked in 1889. He died May 7, 1897, at Zucco, in Sicily. His wife, Marie Caroline Auguste de Bourbon, daughter of Leopold, Prince of Salerno, whom he married in 1844, died in 1869, and in 1866 and 1872, he lost his two sons. Two volumes of his *Histoire des Princes de Condé* were published in 1869. His pamphlet, *Lettre sur l'histoire de France* (April, 1861) excited a sensation by its attacks upon Napoleon III. and Prince Napoleon. Among other publications is his *Les institutions militaires de la France* (1867).

AUNE, ōn. The French cloth-measure corresponding to the English *ell.* Both words are derived from the Lat. *ulna.* The English ell = 1¼ yards = 45 inches; the French *aune usuelle* (or *nouvelle*) = 1⅕ meters = 47¼ inches English. The old *aune* was a little shorter.

AUN'GERVILLE, Richard. See Bury, Richard de.

AUNT PHIL'LIS'S CAB'IN. A story by Mary H. Eastman (1852), a reply to *Uncle Tom's Cabin.*

AU'RA (Lat. *aura,* air). Any subtle, invisible fluid, supposed to flow from a body; an effluvium or exhalation, as the aroma of flowers or the odor of the blood.

AURAM'IN. See Coal-Tar Colors.

AURANGABAD, ou-rŭŋ'gȧ-bäd' (*Aurungzebe* + Hind., Pers. *abad,* abode, dwelling, town). A city of Hyderabad, India, on the Dudna, an affluent of the Godavari, 234 miles east of Bombay by rail, and 67 miles northeast of Ahmednagar (Map: India, C 5). It has a considerable trade in grain and cotton. Its notable monuments comprise the great mosque, the mausoleum of Aurungzebe's daughter, the ruins of the palace or citadel, and five sculptured caves. The city was founded in 1620; under Aurungzebe it became the capital of the Deccan and a city of great importance. After the transference of the capital to Hyderabad its importance declined and its population decreased from 100,000 to 33,887 in 1891.

AURAN'TIA. See Coal-Tar Colors.

AU'RATES. The salts of auric acid (q.v.).

AURE'LIAN, or Rome in the Third Century. An historical romance by William Ware, first published as *Probus* (1838).

AURE'LIA'NUS, Lucius Domitius (c.212-275 a.d.). One of the most powerful of the later Roman emperors. He was of humble origin, his father having been a husbandman. Enlisting early as a common soldier, he rapidly distinguished himself, and held the highest military offices under Valerianus and Claudius II. On the death of Claudius (a.d. 270), Aurelianus was elected Emperor by the army. He began his reign by vigorous opposition to the barbarian Iuthungi and Allemanni, whom he expelled. Thereafter, he commenced the erection of a new line of fortified walls around Rome, which were not completed till the reign of Probus (a.d. 276). Their ruins still mark the boundaries of Rome in the time of Aurelian. Finding that the Province of Dacia (now Transylvania and Wallachia) could not be maintained against the assaults of the Goths, he surrendered it, on certain conditions, and strengthened the frontier of the Roman Empire by making the Danube its boundary. He next turned his attention to the East, where the renowned Queen of Palmyra, Zenobia (q.v.), had extended her sway from Syria to Asia Minor and Egypt. Aurelianus defeated her in two battles, and besieged her in Palmyra, from which she attempted to escape, when she saw defiance would prove unavailing. She was, however, taken prisoner. Soon afterward, the city surrendered and was treated leniently. Shortly after Aurelianus had departed, a new insurrection took place. He returned in 273 and gave the splendid city up to destruction. Aurelianus was again called to the East by a rebellion in Egypt, instigated by Firmus, a merchant of great influence, whom he speedily overthrew. In 274, Tetricus, who had held imperial power in Gaul since before the death of Gallienus, finding himself unable to wield it, surrendered it to Aurelianus. By restoring good discipline in the army, order in domestic affairs, and political unity to the Roman dominions, Aurelianus merited the title awarded to him by the Senate, "Restorer of the Roman Empire." He fell as the victim of a conspiracy among his officials during his campaign against the Persians (a.d. 275).

AURELIAN, Wall of. A massive wall begun by Aurelian in a.d. 271 as a defense against the barbarians, and completed under Probus. It was about 54 feet in height, nearly 12 miles long and inclosed an area of 5019 square miles. The wall was built in great haste and includes the remains of buildings and garden-walls, some with statues in their original niches. This method of construction has made possible the recovery of a number of statues and frescoes on the walls of houses filled in instead of being demolished in the hurry of building. A covered way at the base of the wall is provided with loopholes toward the outer and an arcade on the inner side. Towers to the number of 381 connected with this passage and with the battlements above. The course of the wall followed the line of octroi. Until recent years the wall was in fair preservation, but is now falling into decay owing to the failure of the authorities to provide for its maintenance. For a full account, consult Lanciani, *The Excavations of Ancient Rome* (Boston, 1897).

AURELIAN WAY. A military road leading from Rome along the coast to Pisa, extended in B.C. 109 to Genoa, and under Augustus into Gaul.

AURE'LIUS, MARCUS, surnamed ANTONINUS (A.D. 121-180). A Roman Emperor. He was born at Rome, April 21, 121, the son of Annius Verus and Domitia Calvilla. His original name was Marcus Annius Verus. On his father's death, he was adopted by his grandfather, who spared no pains to render him preëminent in every art and science. His fine qualities early attracted the notice of the Emperor Hadrian, who used to term him not *Verus*, but *Verissimus*, and who conferred high honors on him, even while a child. When only 17 years of age, he was adopted, with Lucius Ceionius Commodus Verus (commonly known as Lucius Verus), by Antoninus Pius, the successor of Hadrian; and Faustina, the daughter of Antoninus, was selected for his wife. In the year 140 he was made consul; and from this period to the death of Antoninus, in 161, he continued to discharge the duties of his various offices with the greatest promptitude and fidelity. The relation which subsisted between him and the Emperor was of the warmest and most familiar kind. On his accession to the throne he strikingly illustrated the magnanimity of his character by voluntarily sharing the government (which Antoninus had left, in his last moments, and the Senate offered, to him alone) with young Lucius Verus, to whom Aurelius gave his daughter Lucilla in marriage. Toward the close of 161, the Parthian War broke out, and Lucius, a young man of vigor and action, was sent to the frontiers of the Empire to repel the incursions of the barbarians; but, intoxicated with the enervating pleasures of the East, he obstinately refused to go beyond Antioch, and intrusted the command of the army to his lieutenant, Cassius, who gained several brilliant victories. Lucius returned to Rome in 166, and enjoyed a triumph to which he had no real claim; for all the great achievements of the war were accomplished by his officers, while he was reveling in the most extravagant licentiousness.

In the meantime, Marcus Aurelius had distinguished himself by the prudence and energy with which he administered affairs at home. A formidable insurrection had long been preparing in the German Provinces; the Britons were on the point of revolt, and the Chatti (Hessians) were waiting for an opportunity to devastate the Rhenish Provinces. Within Rome itself raged a pestilence, believed to have been brought home by the troops of Lucius; frightful inundations and earthquakes had laid large portions of the city in ruins, destroyed the granaries in which were kept the supplies of corn, and thus created almost universal distress, which stimulated to an incalculable degree the terror which the citizens entertained of their savage enemies. To allay the popular perturbation, Marcus resolved to go forth to the war himself. Hecatombs were offered to the offended gods, and the Roman legions set out for the north. Marcus and Lucius were, for the time, completely successful. The pride of the Marcomanni and the other rebellious tribes inhabiting the country between Illyria and the sources of the Danube, was humbled, and they were compelled to sue for peace in 168; in the following year Lucius died. The contest was renewed in 170, and may be said to have continued with intermissions during the whole life of the Emperor. Although fond of peace, both from natural disposition and philosophic culture, he displayed the sternest rigor in suppressing the revolts of the barbarians; but in order to accomplish this, he had to enroll among his soldiery vast numbers of gladiators and slaves, for his army had been thinned by the ravages of the plague. His headquarters were Pannonia, out of which he drove the Marcomanni, whom he subsequently all but annihilated in crossing the Danube. The same fate befell the Iazyges; but the most famous as well as the most extraordinary of all his victories was the miraculous one which he gained over the Quadi (174), and which gave rise to copious discussion among Christian historians and others. Dio Cassius's account is that the Romans were perishing of thirst in the heat of summer, when suddenly the cloudless sky darkened and abundant showers fell, of which the soldiers were taking advantage when the barbarians attacked, and would have cut them to pieces, if a storm of hail and fire had not descended on the former. That some extraordinary phenomenon occurred is evident, for there is a letter of Aurelius still extant in which he commemorates the event; and he was a man incapable of uttering a falsehood, not to mention that there was an entire army living to disprove the statement if untrue. The effect of this remarkable victory was instantaneously and widely felt. The Germanic tribes hurried from all quarters to make their submission and obtain clemency; but the practical advantages that might have resulted from this were nullified by a new outbreak in the East, occasioned through the infamous treachery of the Empress, which demanded his presence; and though suffering from failing health, he was obliged to leave Pannonia. Before his departure, however, he learned that the ambitious governor, Avidius Cassius, who had rebelled against him and seized the whole of Asia Minor, had perished by assassination. The conduct of Marcus Aurelius on hearing of his enemy's death was worthy of the sublime virtue of his character. He lamented that the fates had not granted him his fondest wish—to have freely pardoned the man who had so basely conspired against his happiness. Like Cæsar in similar circumstances, but in a more purely humane spirit, he received the head of his murdered adversary with feelings quite opposite to what had been anticipated, rejecting the bloody gift with all the loathing of a benevolent nature, and even shrinking from the presence of the murderers. On his arrival in the East, he exhibited the same remarkable magnanimity. He burned the papers of Cassius without reading them, so that he might not be at liberty to suspect any as traitors; treated the provinces which had rebelled with extreme gentleness; disarmed the enmity and dispelled the fears of the nobles who had openly favored his insurgent lieutenant. While he was pursuing his work of restoring tranquillity, Faustina died in an obscure village at the foot of Mount Taurus; and her husband (and this was perhaps the greatest defect in his character), though undoubtedly conscious of her glaring profligacy and infidelity, paid the most lavish honors to her memory.

On his way home he visited Lower Egypt and Greece, displaying everywhere the noblest solicitude for the welfare of his vast Empire, and drawing forth from his subjects, who were astonished at his goodness, sentiments of the profoundest admiration and regard. At Athens, which this Imperial pagan philosopher must have venerated as a pious Jew did the city of Jerusalem, he showed a catholicity of intellect worthy of his great heart, by founding chairs of philosophy for each of the four chief sects—Platonic, Stoic, Peripatetic, and Epicurean. No man ever labored more earnestly to make that heathen faith which he loved so well, and that heathen philosophy which he believed in so truly, a vital and dominant reality. Toward the close of the year 176, he reached Italy, and celebrated his merciful and bloodless triumph on December 23. In the succeeding autumn he departed for Germany, where fresh disturbances had broken out among the restless and volatile barbarians. He was again successful in several sanguinary engagements; but his originally weak constitution, shattered by perpetual anxiety and fatigue, at length failed, and he died, either at Vienna or at Sirmium, on March 17, 180, after a reign of twenty years.

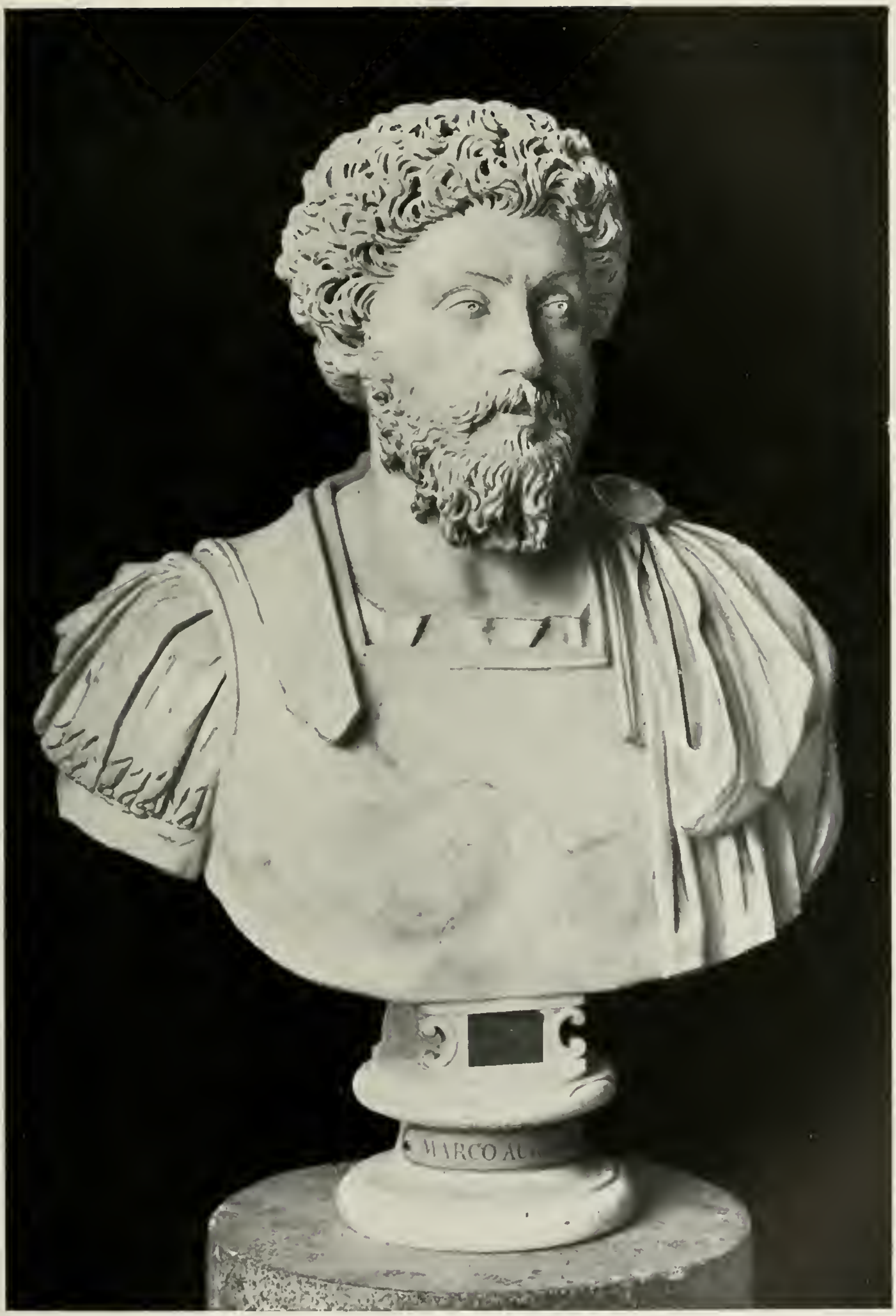
Marcus Aurelius was the flower of the Stoic philosophy. It seems almost inexplicable that so harsh and crabbed a system should have produced so pure and gentle an example of humanity as the records of pagan history can show. Perhaps, as a modern philosophic theologian suggests, it was because Stoicism was the most solid and practical of the philosophic theories, and the one which most earnestly opposed itself to the rapidly increasing licentiousness of the time, that the chaste heart of the youth was drawn toward it. At 12 years of age, he avowed himself a follower of Zeno and Epictetus. Stoics were his teachers—Diognotus, Apollonius, and Junius Rusticus; and he himself is to be considered one of the most thoughtful teachers of the school. Oratory he studied under Herodes, Atticus, and Cornelius Fronto. His love of learning was insatiable. Even after he had attained to the highest dignity of the State, he did not disdain to attend the school of Sextus of Chæronea. Men of letters were his most intimate friends, and received the highest honors, both when alive and dead. His range of studies was extensive, embracing morals, metaphysics, mathematics, jurisprudence, music, poetry, and painting. Nor must we forget that these were cultivated not merely in the spring-time of his life, when enthusiasm was strong and experience had not saddened his thoughts, and when study was his only labor, but during the tumults of perpetual war, and the distraction necessarily arising from the government of so vast an Empire. The man who loved peace with his whole soul died without beholding it, and yet the everlasting presence of war never tempted him to sink into a mere warrior. He maintained, uncorrupted to the end of his noble life, his philosophic and philanthropic aspirations. After his decease, which was felt to be a national calamity, every Roman citizen, and many others in distant portions of the Empire, procured an image or statue of him, which more than a hundred years after was still found among their household gods. He became almost an object of worship, and was believed to appear in dreams, like the saints ol subsequent Christian ages.

There is one feature in his character, however, which it would be dishonest to pass over—his hostility to Christianity. He was a persecutor of the new religion; and, it is clearly demonstrated, was cognizant, to a certain extent at least, of the atrocities perpetrated upon its followers. Numerous explanations have been offered of his conduct in this matter. The most popular one is that he for once allowed himself to be led away by evil counselors; but a deeper reason is to be found in that very earnestness with which he clung to the old heathen faith of his ancestors. He believed it to be true, and to be the parent of those philosophies which had sprung up out of the same soil; he saw that a new religion, the character of which had been assiduously, though perhaps unconsciously, misrepresented to him, both as an immoral superstition and a mysterious political conspiracy, was secretly spreading throughout the Empire, and that it would hold no commerce with the older religion, but condemned it, generally in the strongest terms. It was, therefore, comparatively easy, even for so humane a ruler, to imagine it his duty to extirpate this unnaturally hostile sect. John Stuart Mill finds, in this tragic error of the great Emperor, a most striking warning against the danger of interfering with the liberty of thought.

In 177, Aurelius published his first edict against the Christians, and the persecution lasted during this and the following year. The aged Polycarp was burned at the stake at Smyrna, and Saint Cecilia was martyred at Rome (September 16, 178), while large numbers perished in the furious persecution at Lugdunum (Lyons), in Gaul. Athenagoras of Athens, a Christian philosopher, addressed to the Emperor a defense (*Apologia*) of the Christians, still extant, which did not avail to check the martyrdom.

Aurelius was the author of a beautiful ethical work, the *Meditations*, written in Greek, the finest product of the Stoic philosophy. It is edited by Stich (Leipzig, 1882): translated by Long (London, 1862), Rendall (London, 1897), and (in selections) by Smith (London, 1899). Consult: Farrar, *Seekers After God* (London, 1868); Renan, *Marc-Aurèle* (Paris, 1881; translated, London, 1888).

AURELIUS, Marcus, Statue of. A fine bronze equestrian statue in Rome, which, during the Middle Ages, stood near the Lateran, and was removed in 1538 to its present commanding position on the Capitoline Hill. Its preservation is probably due to the fact that it was popularly believed to be the statue of Constantine, the first Christian Emperor. In 1347, when Rienzi was chosen to the tribuneship, wine and water



MARCUS AURELIUS

FROM THE BUST IN THE BERLIN MUSEUM

were caused to flow from the nostrils of the horse. The present pedestal is the work of Michelangelo, and was cut from a column of the Temple of Castor and Pollux.

AURELIUS VIC'TOR, SEXTUS. A Roman historian of the Fourth Century A.D. He wrote *De Cæsaribus*, a collection of brief biographies of the Emperors from Augustus to Constantius. According to his own account, contained in that work, he was appointed by Julian governor of a division of the Province of Pannonia, and, by Theodosius, city prefect. He is also generally identified as the one of the name who was consul with Valentinian, A.D. 373. To him are wrongly attributed the *Origo Gentis Romanæ*, the *De Viris Illustribus Urbis Romæ*, and the *De Vita et Moribus Imperatorum Romanorum*.

AURELLE DE PALADINES, ô'rĕl' de pá'lá'dên', LOUIS JEAN BAPTISTE D' (1804-77). A French general. He entered the army in 1824, served in Algiers in 1841-54, won distinction in the Crimean War, and became a general of division in 1855. He was not in active service at the outbreak of the Franco-German War, but received a command after the battle of Sedan, organized the Army of the Loire, and drove Von der Tann from Orleans, winning the first victory for France. He was repulsed in an attack upon the army of Prince Frederick Charles, was beaten by the Grand Duke of Mecklenburg at Artenay, and was soon afterward removed from his command, though he subsequently commanded the National Guard in the Department of the Seine. He wrote *Campagne de 1870-71; la première armée de la Loire* (1872).

AU'REOLE (Lat. *aureola*, golden, sc. *corona*, crown). The glory which radiates from the body of a transfigured, divine, or other supernatural being in representations of Christian art. It differs from the nimbus (q.v.), which radiates from the head only, in being an emanation of light from the entire body. It is of various shapes: circular, oval, or egg-shaped, quadrilobed and lozenged. Sometimes, as in enthroned figures of Christ, there is a double aureole—one around the upper, and the other around the lower part of the body. The aureole is of two kinds: diffused or circumscribed, according as the rays of light, as they flare outward, end in an encircling band or melt into space. These rays are sometimes straight, sometimes flamboyant. The aureole was of later origin than the nimbus; it was not used until after the Eighth Century, and was generally abandoned by Renaissance painters of the Fifteenth Century. It was used almost entirely around figures of Christ, the Trinity, and the Virgin Mary.

AUREUS, a̤'rê-ŭs, or DENARIUS AUREUS (Lat. golden, from *aurum*, gold). The oldest standard gold coin of Rome, first coined B.C. 207. Its average weight was 121 grains, and value about $5.00.

AU'RIC AC'ID (Lat. *aurum*, gold). A name formerly given to gold peroxide, a brown-black powder which is obtained by precipitating the auric chloride with alkalies. It combines with basic radicals to form salts, which are called *aurates*, as ammonium aurate, which is the scientific name for fulminating gold.

AU'RICLES (Lat. *auricula*, dimin. of *auris*, ear). Two cavities of the heart. See CIRCULATION.

AURIC'ULA (Lat. dim. of *auris*, ear, so named on account of a fancied resemblance of the leaves to the ears of an animal), *Primula auricula*. A plant of the same genus with the primrose, little grown in America, but valued in England for the fragrance and beauty of its flowers. The auricula is a native of the Alps and other mountains of the middle and south of Europe, and of sub-alpine situations in the same countries. It is found also on the Caucasus and the mountains of Syria. It grows in shady and moist places. In the wild state it has comparatively small flowers, of a simple yellow color, on short stalks, forming an umbel. It has been greatly improved by cultivation. Red, pink, crimson, apple-green, and mulberry are the chief colors which the different varieties exhibit. More than 1200 varieties have been cultivated, and new ones are from time to time raised from seed. Some of them are entirely of one color, others of two or more; some are delicately shaded, and some variegated. The flowers of desirable varieties are large and almost round, with the white or yellow eye of the centre distinct, and its color does not mix with the ground color. The scape must be tall, and the full umbel of erect flowers rise entirely above the leaves. The green margin adds much to the beauty of many varieties. The auricula blooms in April and May, and often also a second time in the end of autumn. It succeeds best in a rich, light soil. The finer varieties are cultivated in pots. They ought, previous to flowering, to stand in an airy, sunny situation. They are propagated by offsets, generally in the latter part of August. When auricula is to be raised from seed, care ought to be taken to select the finest flowers, which are encouraged to ripen their seeds by exposure to sun and air. They ought to be protected from heavy rains by hand-glasses placed over them. The seed is sown either in autumn or spring, usually in boxes placed under shelter or in a slight hotbed.

AURIC'ULAR CONFES'SION. See CONFESSION.

AU'RIFA'BER (Lat. for family name Goldschmied). German Protestant theologians and reformers. (1) ANDREAS (1514-59). A friend of Melanchthon: born in Breslau. He received the degree of M.A. at Wittenberg University in 1534. He taught in the philosophical faculty; then was school principal. He took up medicine, and was body physician to Duke Albert of Prussia for ten years. In 1542 he returned as professor of medicine to Wittenberg, and after 1545 was ducal body physician at Königsberg, and professor in the university, although his instruction was much interrupted by the diplomatic journeys on which he was sent by the Duke. He was an ardent defender of Osiander (1498-1552), whose daughter was his second wife. As an Osianderian he was bitterly attacked by the ultra-conservative Lutherans, whose leader (Flacius) dubbed him 'dog-doctor,' because he had issued a book upon the treatment of canine diseases. He died at Königsberg, December 12, 1559. His writings were chiefly medical. (2) JOHANNES (1517-68). A brother of Andreas, and, like him, a friend of Melanchthon; born at Breslau, January 30, 1517. He received the degree of M.A. at Wittenberg University in 1538, and became professor at Rostock in 1550. After a varied and fruitful activity (chief author of the Mecklenburg Church Ordinances, 1551), he became professor of theology at Königsberg in 1554, resigned in 1565, and died at Breslau, October 19, 1568. He also was involved in the Osiander strife which wrought up the theologians of that time. (3) JOHANNES (c.1519-75). A zealous friend of Luther; born in county of Mansfeld, Saxony, and educated at Wittenberg. He became tutor to the young Count Mansfeld, and in the war of 1544 was with the army as chaplain. He lived with Luther as his secretary (1545); was present at Luther's death, February 18, 1546, and closed the great Reformer's eyes. He was taken prisoner at Mühlberg, April 24, 1547, while serving as chaplain in the Schmalkald War, and was in prison till the autumn of 1547. He was a furious critic of Melanchthon. After being for some years court preacher at Weimar, he was compelled to flee to Eisleben (1561), and there began those Lutheran publications which have given him fame. In 1566 he was appointed minister of the Lutheran Church at Erfurt, holding the place until his death, which occurred there, November 18, 1575. He began, in 1540, collecting Lutheran MSS., and by 1553 had 2000 letters of Luther's; the same year he shared in the 12-volume German and Latin edition of Luther which appeared in Jena in 1556. He issued two volumes of Luther's letters (1556-65); also a supplement to the Jena edition and the *Works* in 1564-65 (2 vols.). In 1566 he issued his famous *Tischreden und Colloquia Dr. M. Luthers.*

AURI'GA (Lat. *auriga*, charioteer, driver), or THE WAGONER. A northern constellation containing Capella, a star of the first magnitude.

AURIGNY, ō'rê'nyê'. See ALDERNEY.

AURILLAC, ō'rê'yȧk' (probably from Aurelius, the Roman Emperor). A town of France, capital of the Department of Cantal (Auvergne), situated in a pleasant valley on the banks of the Jordanne, about 269 miles south of Paris (Map: France, J 7). It is said to owe its origin to a Benedictine monastery, founded in the Ninth Century, by Saint Géraud. The streets are wide but irregular, and are kept clean by streams supplied by a reservoir above the town and by a canal from the Jordanne. The neighboring quarries supply slates to cover the houses. The principal buildings of Aurillac are the churches of Notre Dame and Saint Géraud, the castle of Saint Etienne; the theatre; the college buildings, which contain a valuable public library; and the grain market. There is also a monument erected to the memory of the French philanthropist, M. de Montyon. Paper, jewelry, lace, copper utensils, leather, and lime are the chief industrial products. The English, in the Fourteenth and Fifteenth Centuries, often besieged the town, and it was frequently taken and pillaged during the religious wars in France in the Sixteenth Century. Pope Sylvester II., whose statue is to be seen at Aurillac, was born there, as was the infamous Carrier of the first French Revolution. Population, in 1896, 13,531.

AU'RIN (Lat. *aurum*, gold), $C_{19}H_{14}O_3$. A coloring substance used in the manufacture of lacquers. It is obtained in the form of beautiful green needles, by the action of sulphuric and oxalic acids on carbolic acid at 130-150° C. Reducing agents transform it into a colorless substance known as leucarin, $C_{19}H_{16}O_3$. Owing to the difficulty of fixing it, it is not much used as a dye, though its solution in alkali has a beautiful fuchsine red color.

AURISPA, ou-rē'spȧ, GIOVANNI (c.1369-1460). A distinguished Italian humanist of the Fifteenth Century, born at Noto, in Sicily, about 1369. In 1418 he went to Constantinople for the purpose of learning Greek; after some years he returned to Italy, bringing with him 238 manuscripts of ancient Greek authors, among them Pindar, Callimachus, Oppian, Æschylus, Sophocles, Plato, Plotinus, Xenophon, Lucian, Arrian, Dion Cassius, Diodorus Siculus, Strabo, and Procopius. On his return he lived at Venice, and later held the chair of Greek literature at Bologna. Niccolò de' Niccoli (q.v.) was instrumental in calling him to Florence, where he replaced Guarino da Verona as teacher of Greek. But some disagreement cut short his stay in Florence, and he soon removed to Ferrara. In 1438, the Greek Emperor, John Palæologus, called him to assist in the council called by Pope Eugene IV.; the latter made Aurispa his secretary in 1441, which office he held for six years. He died at Ferrara in 1460. Of his many translations the following only have been published: Hierocles' *Liber in Pythagoræ Aurea Carmina, Latinitate Donatus* (Padua, 1474); *Philisci Consolatoria, etc.* (Paris, 1510). Many other translations remain in manuscript in Italian libraries. Consult: Voigt, *Die Wiederbelebung des klassischen Alterthums*, Vol. I. (Berlin, 1893); Symonds, *Renaissance in Italy*, Vol. II. (London, 1877).

AUROCHS, a̤'rŏks (MHG. *ūrohso*, from *ūr*, AS. *ūr*, Engl. *owre*, wild ox + *ohso*, ox). The European bison (*Bison bonasus*). See BISON and PLATE OF BISONS.

AURO'RA. A city in Kane County, Ill., on Fox River, 39 miles west of Chicago, and on the Chicago and Northwestern, and the Chicago, Burlington, and Quincy railroads (Map: Illinois, D 2). It is an important manufacturing place, producing extensively carriages and wagons, silver-plated ware, wheel-scrapers, sashes and blinds, etc. It has also machine shops, smelting-works, stove-works, and railway repair shops. Aurora owns and operates its water-works and electric-light plant, and has been presented with a public library by Andrew Carnegie. It was settled in 1834, and first incorporated 1837. Under the charter of 1887, now in operation, the government is vested in a mayor, elected for two years, and a city council. Other officers also are elected by the people. Annual town-meetings are held to elect highway commissioners and to levy road and bridge taxes. Population, in 1860, 6011; in 1890, 19,688; in 1900, 24,147.

AURORA. A city in Lawrence County, Mo., 270 miles southwest of Saint Louis; on the Saint Louis and San Francisco, and the Kansas City, Fort Scott, and Memphis railroads (Map: Missouri, C 5). The adjacent region is engaged principally in agriculture, fruit-growing, and lead and zinc mining, and the city carries on a considerable trade in the products of these industries. There are also a foundry and machine shops, flour mills, etc. Population, in 1890, 3482; in 1900, 6191.

AURORA. A city, and the county-seat of Hamilton County, Neb., 110 miles west by south of Omaha; on the Burlington and Missouri River Railroad (Map: Nebraska, G 3). It is in a farming and dairying region, and has foundries and machine shops, flouring mills, and extensive creamery interests. Population, in 1890, 1862; in 1900, 1921.

AURORA. A town in Cayuga County, N. Y., settled about 1775, 16 miles southwest of Auburn; on Cayuga Lake, and the Lehigh Valley Railroad. It is a beautiful residential town, in the centre of an agricultural region which produces grain, hay, live-stock, grapes, and apples. Aurora has a public library, and is the seat of Wells College for women, founded 1868. Town-meetings are held every other year to elect officers. Population, about 1000.

AURORA (Lat. from the root *urere*, to burn, Skt. *usas*, dawn, Gk. Ἠώς, or Ἕως, *Eōs*, or *Heōs*). The goddess of the dawn, or 'morning redness.' According to Hesiod, she was the daughter of Hyperion and Thia, sister of Helios and Selene, and wife of the Titan Astræus. Zephyrus, Boreas, Notus, Hesperus, and the other stars were her children. She rises from Oceanus, and her rays are the first indication of the coming of Helios (the sun). In legend Aurora appears chiefly as the abductor of beautiful youths, Tithonus, Orion (q.v.), and Cephalus, the hunter. By Tithonus she became the mother of Memnon (q.v.), and by Cephalus of Phaëton. In the earlier poets Aurora is never more than the early morning, and Euripides first identified her with Ἡμέρα, *Hēmera* (the day). In art she appears as present at the death and burial of Memnon, as carrying away her favorites, and as a goddess of light, either as a winged maiden, or as in a chariot with winged horses preceding Helios.

AURORA. A renowned ceiling painting by Guido Reni in the Casino Rospigliosi at Rome. Aurora precedes the chariot of the sun god, scattering flowers in his path. The fresco is notable for its coloring, and is the greatest work of the painter. For illustration see RENI, GUIDO.

AURORA BO'REA'LIS (Lat., 'northern dawn or light'). A luminous phenomenon seen during the night time in the heavens, most frequently in Europe, to the north of the observer's zenith, but sometimes covering the whole sky. By connecting together the statistics from all possible observers, Fritz was able to show that there is in the Northern Hemisphere a belt of greatest frequency. The centre of this belt passes through the southern part of Hudson Bay, a little south of Cape Farewell and Iceland, through North Cape, Norway, over the mouth of the Lena River, over Point Barrow, Alaska, thence to the centre of Hudson Bay. Observers who are north of this belt see the aurora more frequently to the south than to the north, and also see it less and less frequently the farther north they go; observers who are south of the belt see the aurora to the north of them, but see it less frequently as they are nearer to the equator. A similar rule obtains in the Southern Hemisphere. There can be no doubt that the aurora is the result of a discharge of electricity through the atmosphere. It has been supposed that since a very thin atmosphere, such as that remaining in a glass jar or receiver of an air-pump, converts the short bright electric spark into a lengthened delicate discharge, analogous to the aurora, the existence of the aurora itself necessarily implies a very thin atmosphere, and that therefore its light must emanate from a region 50 or 100 miles above the earth's surface. But if we consider the aurora as a discharge through aqueous vapor or other rare gas, then we have nothing to do with the gaseous atmosphere as such, but with the aqueous component only, and at moderate altitudes the density of the aqueous vapor is so slight that it must act as a very light gas, similar to that present in the vacuum chamber. As regards the height of the aurora above the earth's surface, several methods have been devised for calculating it; but all the trigonometrical calculations, based upon most careful observations, seem to show that the definite features that we see in the aurora light are perspective phenomena, and that the calculation of their height cannot be safely made by the method of simultaneous observations at two stations and measured altitudes and azimuth. In fact, the argument for the existence of the auroral light quite close to the earth's surface is too strong to be ignored. The character of this light is partially determined by means of the spectroscope, which establishes the fact that it comes from luminous particles of vapors or gases. The most prominent line of its spectrum is a yellow line, nearly identical with the yellow line known as the air-line of the atmosphere. The special lines of the auroral spectrum apparently belong to the nitrogen.

The auroræ generally present a variety of interesting optical phenomena that may generally be analyzed into component parts; viz., long, slender beams of light, usually yellow, but sometimes green, purple, violet, or rose. These beams are, by observation, ascertained to be approximately parallel to the free magnetic needle; by their association together they appear to form cylindrical bars, waved surfaces, rich drapery, and small clouds of light. Inasmuch as the slender beams are parallel to each other, it can easily happen that an observer may be so located as to see some of them end on; these will be scarcely visible. Other beams near by will appear greatly foreshortened, and pointing directly to the vacant centre. Those at a distance will appear less foreshortened, but also pointing toward the centre. There is thus formed a so-called corona, or circlet, or rays surrounding the central region. Observation has shown that its position corresponds very closely to that point in the sky toward which the free magnetic needle would point. It is therefore common to say that auroral beams are parallel to the magnetic needle; and this fact suffices to assure us that the aurora is composed of luminous magnetic matter acted upon by the so-called earth's magnetism, but, more properly, by the magnetic field surrounding the earth, just as is the compass needle.

BIBLIOGRAPHY. The literature relative to the aurora borealis is very extensive and widely diffused. Excellent general summaries of our knowledge are: Fritz, *Das Polarlicht* (Leipzig, 1881); Angot, *Aurora Borealis*, International Scientific Series, Vol. 81 (London, 1896); Lemstrom, *L'aurore boréale* (Paris, 1886). The largest collections of observations arranged in the order of date will be found in the works of: Lovering, *On the Periodicity of the Aurora Bo-*

realis (Boston, 1873); Fritz, *Verzeichniss von Beobachtungen des Polarlichtes* (Vienna, 1873); Rubenson, *Catalogue des aurores boréales observées en Suède* (Stockholm, 1879-82). The reports of the various international expeditions for the observation of meteorology and magnetism in the polar regions during 1881-83 fill about 30 volumes, of which one-fourth treat of the aurora. The Belgian and other expeditions to the Antarctic contain a small but relatively important contribution from that region. The pioneer work in this line was that done by the French *Expédition du Nord* (1838-42), whose volumes on auroras were prepared by Bravais and Martins. The question of the altitude of the aurora has been reviewed by C. Abbe in an article under that title, published in *Terrestrial Magnetism* (Baltimore, 1900).

AURORA LEIGH, lē. A novel in blank verse, by Mrs. Browning (q.v.), which tells of the childhood of a young girl; the death of her Italian mother; her return to her father's English home; her gradually passing despair in her new surroundings; her love for her cousin, Romney Leigh; her melancholy disillusions, and her final marriage with him. Written during Mrs. Browning's early married life in Florence, it was published in 1857. She subsequently wrote of this poem that it was "the most mature of my works—the one in which my highest convictions of work and art have entered."

AURUNGZEBE, a̤'rŭng-zēb', or **AURANGZIB** (Hind., 'ornament of the throne'). The last great Emperor of the Mogul dynasty in India. He was born October 22, 1618, and died February 21, 1707. He was the third son of Shah Jehan (q.v.), and in religion he was a bigoted Sunni. He was set by his father over the Mogul Deccan, while his elder brothers, Dara and Shuja, resided respectively at Agra, with the court, and in Bengal. The youngest brother of Aurungzebe, named Murad, was viceroy of Gujerat. In 1657 Shah Jehan fell seriously ill, and a contest for the throne was immediately begun by his sons. Aurungzebe, by a mixture of duplicity and fanaticism, outwitted his brothers, the two elder of whom he murdered, and made his father a prisoner in his own palace of Agra, and kept him so until the death of the latter, possibly by foul play, in 1665. The usurper assumed the title of Alumgir, or 'conqueror of the world.' The reign of Aurungzebe, which began in 1658, was troubled, almost as soon as it had begun, by the opposition of a Mahratta chieftain from the mountains of Konkan, named Sivaji. Treachery was employed against this wily foe in vain, for he remained independent until his death, in 1680. A religious war against the Rajah of Udaipur, which dragged on for several years, resulted unsuccessfully for Aurungzebe, who was forced to abandon his military operations in Rajputana in 1682 on account of an abortive rebellion of his son Akbar. Between 1682 and 1689, however, Aurungzebe conquered the sultans of Bejapur and Golkonda, and thereby brought the Moguls into touch with the English at Madras. The closing years of Aurungzebe's long reign were full of sorrow, and it is noteworthy that he alone, of all the Mogul emperors, forbade the composition of any history of his reign. Despite the external pomp and ceremony the Mogul Empire was tottering to its fall. The treachery of Aurungzebe alienated Mohammedan Shiites from him, while his religious bigotry won for him the undying hatred of the Hindus, whose faith he had insulted and had endeavored to exterminate. Consult Stanley Lane-Poole, *Aurungzib* (London, 1893).

AUSABLE, ō-sä'b'l. A town in Clinton County, N. Y., on the Ausable River, a short distance west of Lake Champlain. Population, in 1890, 2532; in 1900, 2195.

AUSABLE CHASM. A deep, narrow gorge, two miles in length, worn by the Ausable River in the hard quartz sandstone of the Potsdam formation, popular for its scenic attractions. The rocks of the neighborhood are traversed by numerous faults or lines of displacement, along which lines the hard rocks have been to some extent crushed and broken. The river has taken advantage of these lines of weakness, and has worn its zigzag course to a depth, in places, of 175 feet along the almost vertical fault planes, thus affording an excellent example of the relation between faults and lines of drainage.

AUS'CULTA'TION (Lat. *auscultare*, to listen). A mode of exploration—by listening—of the condition of the heart, the lungs, the pleura, the œsophagus, certain arteries and veins, the abdominal organs, the gastro-intestinal tract, and the gravid uterus. Diseases, especially those of the heart and lungs, may be detected by listening to the sounds produced in the cavity of the chest. This is done either by the unassisted ear (immediate auscultation) or by the aid of a simple sound-conveying instrument, the stethoscope (q.v.) (mediate auscultation). The normal sounds produced by respiration and the beating of the heart are readily distinguished by the trained ear from the several abnormal sounds indicating disease. Auscultation is one of the most important means of diagnosis. Hippocrates had observed the friction-sound in dry pleurisy as well as succussion in pyopneumothorax. Auenbrugger (q.v.) of Vienna, in 1761, introduced percussion (q.v.), and Piorry (q.v.) of France invented the pleximeter. Both probably appreciated some of the facts of auscultation. But Laënnec (q.v.), in 1816, was the first to demonstrate the great value of ausculation and to introduce it into general use. Raynaud, in 1829, and Collin, in 1831, added respectively to our knowledge of pleuritic friction and pericardial friction. (See PERCUSSION.) According to the views, however, then generally held by physicians, the sounds produced by auscultation and percussion were capable of directly revealing the nature of diseases. In 1839 Skoda (q.v.), in his *Abhandlung über Auskultation und Perkussion*, demonstrated that those sounds were in the first instance only manifestations of peculiar physical states in the body. Being directly produced by certain diseases, those states, and not the sounds caused by them, must be considered as the true symptoms from which the character of diseases can be inferred. Consult: Guttmann, *Handbook of Physical Diagnosis*, translated by Napier (New York, 1880); Flint, *Manual of Auscultation and Percussion* (Philadelphia, 1883).

AUSGLEICH (ous'glīk) **OF 1867**, THE. The agreement or treaty between Austria and Hungary which forms the basis of the political organization of the dual monarchy, Austria-Hungary. It was very largely the work of the Austrian Chancellor, Count von Beust (q.v.) and of Ferenez Deák (q.v.) the Magyar national leader. (See AUSTRIA-HUNGARY.) Consult: Lowell, *Governments and Parties in Continental Europe*, Vol. II. (Boston, 1896); Start, "The Rivalry of Nations," in the *Chautauquan* (December, 1900).

AUSONES, ą′sō-nēz (Αὔσονες, Gk. form of the name *Aurunci*). A hardy mountain tribe of ancient Italy, south of Rome, probably of Oscan stock. The name *Ausonia* was later given to all the lands of the non-Latin tribes of Central Italy, and finally by the poets it was used as synonymous with Italy itself.

AUSO′NIA. One of the six regions into which the Greeks divided Italy at the time of Aristotle. The name was used as synonymous with Italy by Vergil and Roman poets.

AUSO′NIUS, DECIMUS MAGNUS (c.310-394 A.D.). The most conspicuous Roman poet of the Fourth Century A.D. He was born at Burdigala (Bordeaux) about 310. His father was a man of considerable importance, having been at one time honorary prefect of Illyricum, and he appears to have taken care that the young Ausonius should receive an excellent education. Many amiable female relatives fostered and probably flattered the talents of the boy. After finishing his curriculum at Tolosa (Toulouse), he returned to Burdigala, where, after practicing for a short time at the bar, he turned his attention to literature, and soon distinguished himself as a professor of oratory. Some years later he was appointed by Valentinian tutor to his son Gratian, afterwards quæstor, and by Gratian, prefect of Latium, and subsequently Consul of Gaul (379). On the death of Gratian, Ausonius retired from public life to his estate at Burdigala, where he occupied himself with literature and rural pursuits until the time of his death (about 394). The question whether or not Ausonius was a Christian has occasioned much controversy. He probably conformed to Christianity, but with a sort of pagan indifference. His works include translations of Greek eclogues, a collection of 150 epigrams, epistles in verse and prose, 20 so-called idyls and other descriptive pieces, which were admired in their day, and of late have once more come to be read with appreciation for their love of nature. But though destitute of the highest poetic quality, Ausonius occasionally displays a certain neatness and grace of expression, which show that in a better era he might have proved a greater poet. Besides these, he also wrote a panegyric on the Emperor Gratian, full of bombastic adulation. His best-known poems, *Mosella*, contain many charming bits of description, and some strikingly modern touches. Best edition by Peiper (Leipzig, 1886). Consult also: Dill, *Roman Society in the Last Century of the Western Empire*, especially Bk. II., Chap. III. (London, 1899), and for an appreciation, Mackail, *Latin Literature* (New York, 1896).

AUSSEE, ou-sā′ (Ger. *aus*, from + *See*, lake). A market town of Styria, Austria, situated at the southwestern end of the crown-land, at an elevation of 2155 feet (Map: Austria, C 3). Its mountain air and salt baths have made it a popular bathing-place and health resort. The chief products are wood-carvings and salt. In the vicinity are situated the three mountain lakes of Alt-Aussee, Grundl-See, and Toplitz-See, famous for their beautiful scenery. Population, in 1890, 1509.

AUSSIG, ou′sĭk (from Bohem. *Ousti nad Labem*, river mouth over Elbe.) A flourishing manufacturing town of the Austrian crown-land of Bohemia, about 455 feet above sea-level, situated on the left bank of the Elbe, at its junction with the Biela, about 69 miles northwest of Prague, and 9 miles from the Saxon frontier (Map: Austria, D 1). Its notable public buildings are the Rathaus, and the town church, supposed to date from 826, containing a fine painting of the Madonna, by Carlo Dolce, presented by Israel Mengs, whose son, the famous artist, Raphael Mengs, was born in Aussig. The town's affairs are administered by a municipal council of 36, and an executive board of 8 members. The leading industrial establishment is a chemical factory employing some 1500 workmen—the largest in Austria. There are also manufactures of machinery, glass, pottery, woolen and cotton goods, and a considerable trade in grain, fruit, wood, and mineral water. The town is an important station on the direct railway line from Dresden to Prague, and one of the stations of the Elbe Steamship Line. It has two harbors on the river. Population, in 1890 (largely German), 24,000; in 1900, 37,300. Aussig was destroyed in 1426 by the Hussites, and was taken by the Swedes, under Baer, in 1639.

AUS′TEN, JANE (1775-1817). An English novelist. She was born December 16, 1775, at Steventon, Hampshire, where her father was rector. When a girl, Jane learned French and Italian, and read somewhat widely in contemporary English literature. Throughout her life she was distinguished alike by good sense, sweetness of disposition, and personal attractions. Her novels are remarkable for the truthfulness with which they portray the everyday life of the middle classes of England in her time, and for their delicate, yet withal distinct, discrimination of character. Sir Walter Scott said of her: "That young lady had talent for describing the involvements, feelings, and characters of ordinary life, which is to me the most wonderful I ever met with. The big Bow-Wow Strain I can do myself, like any now going; but the exquisite touch, which renders ordinary, commonplace things and characters interesting from the truth of the description and the sentiment, is denied to me." Miss Austen's first four novels—*Sense and Sensibility*, *Pride and Prejudice*, *Mansfield Park*, and *Emma*—were published between 1811 and 1816. *Northanger Abbey* and *Persuasion* appeared in 1818, after her death, which took place at Winchester, July 24, 1817. Consult: Austen-Leigh, *Memoir of Jane Austen* (London, 1871); G. Smith, *Life of Jane Austen* (London, 1890), which contains a full bibliography; Hill, *Jane Austen, Her Home and Her Friends* (New York, 1900); for an historical and critical study, Pollock, *Jane Austen* (New York, 1899); and for delicate appreciation, Howells, *Heroines of Fiction* (New York, 1902).

AUS′TEN, PETER TOWNSEND (1852—). An American chemist; born at Clifton, Staten Island, N. Y. He received his education at the School of Mines of Columbia University, studied chemistry in Germany, and took his doctor's degree at the University of Zürich, Switzerland. In 1876 he returned to the United States and was made instructor in chemistry at Dartmouth College. In 1877 he was appointed professor of chemistry at Rutgers College, and during the following ten years was engaged in teaching in that college and in the New Jersey Scientific School. In 1887 he resigned his chair, and during the next six years devoted his attention exclusively to industrial work. In 1893 he resigned his career as a teacher and was made professor of chemistry at the Brooklyn Polytechnic Institute, where he remained until 1898. In 1899 he became the president of the Austen Chemical Research Company. Dr. Austen published a large number of interesting papers in applied chemistry, patented several valuable manufacturing processes, and wrote: *Kurze Einleitung zu den Nitro-Verbindungen* (Leipzig, 1876), and a translation of Pinner's *Repetitorium der organischen Chemie*, under the title *An Introduction to the Study of Organic Chemistry* (New York, 1883).

AUS′TER. The Latin name of the dry south or southwest wind, the modern sirocco, called **νότος**, *notos*, by the Greeks. The name is connected with the root of *uro*, to burn.

AUSTERLITZ, ous′tĕr-lēts ('the east town on the Littawa;' from Ger. *Ost*, East). A small town in Moravia, about 12 miles east-southeast of the town of Brünn (Map: Austria, E 2). It stands on the Littawa, and has a population of 4000. Austerlitz is celebrated as the place where Napoleon I. defeated the combined forces of Austria and Russia, under the command of their emperors (December 2, 1805). The capitulation of the Austrian General Mack at Ulm on October 17, 1805, had been followed by the French occupation of Vienna on November 14; but though Napoleon held the capital of the enemy, his forces were inferior to the allied army of Austrians and Russians under Kutusoff and Prince Lichtenstein, which was assembled around Olmütz, and threatened a junction with another army under the Austrian archdukes and a force from Prussia. Napoleon determined to strike at the Allies before the expected junction could be effected. He moved northward from Vienna, and at Austerlitz came in touch with the Allies, who had advanced to meet him. The latter, who numbered some 84,000 men opposed to the 70,000 French, attacked in five columns, aimed in oblique order against the French right, the intention of the Allies being to concentrate on that wing, outflank the enemy, and cut off their communication with Vienna. Napoleon, who perceived this purpose, conceived the bold design of permitting the enemy to gain a temporary success over his right wing, allowing him in turn to concentrate his forces against their weakened centre, and, having broken that, to take them in the rear. The plan was admirably executed. At 8 o'clock on the morning of December 2, the left wing of the Allies, consisting of three Russian columns, advanced across a country of frozen marshes, assailed Davout, who held the fords of the Goldbach, forced the passage of that stream, and compelled the French to retreat for some distance; with the aid of reinforcements, however, Davout was able to hold his own, as indeed Napoleon had planned. Meanwhile, heavy masses of French under Soult had been hurled against the centre of the Allies, comprising the fourth Russian column, under Kutusoff; and after a sanguinary conflict the latter was overwhelmed. Lannes, too, on the left of the French, succeeded in driving back the allied right under Bagration. The victorious French troops were then swung upon the rear of the left of the Allies, and of the unhappy three columns the third was entirely crushed, while the others were shattered into fragments. The battle became a rout, and as the remnants of the Allies fled across the river the French artillery broke the ice and thousands of fugitives were drowned. The Allies lost 35,000 men in killed, wounded, and prisoners, while the French loss was only 7800. As a result of the battle, Austria was forced to sign the Treaty of Pressburg on December 26, 1805. In the military career of Napoleon no other event, probably, stands out so brilliantly as Austerlitz, because of his numerical inferiority, the audacity of his plan, the precision with which it was executed, and the completeness of the victory. The glory of Austerlitz—spoken of, sometimes, as the battle of the three emperors, from the presence of the Russian and Austrian emperors in the field—made even the disaster at Trafalgar seem of little consequence.

AUSTERLITZ, The Sun of. A term applied to anything which augurs good. It is an allusion to the sudden appearance of the sun which brightened the overcast dawn just before the battle of Austerlitz, and which Napoleon accepted as an auspicious omen for the French.

AUS′TIN. A city and the county-seat of Mower County, Minn., 100 miles south of Saint Paul; on Red Cedar River, and on the Chicago Great Western and the Chicago, Milwaukee and Saint Paul railroads (Map: Minnesota, F 7). It is the seat of the Southern Minnesota Normal College, and contains Lafayette Park. Among prominent buildings are the public library (Carnegie), central high school, county court-house, and Saint Augustine's Church (Roman Catholic). The city is surrounded by fertile prairie land, the products of which are principally live stock, butter, wheat, barley, flax, grass seeds, etc. It exports extensively, and has meat-packing establishments, flouring-mills, brick and tile works, foundry, railroad shops, cement-works, creamery, etc. Manufactures are promoted by excellent water-power. Settled in 1854, Austin was incorporated as a village in 1868, and in 1873 was chartered as a city. The government is administered under a charter of 1887 which provides for a mayor, annually elected, and a city council. The city owns its water-works and electric-light plant. Population, in 1890, 3901; in 1900, 5474.

AUSTIN. The county-seat of Lander County, Nev., about 140 miles east by north of Carson City; on the Nevada Central Railroad (Map: Nevada, E 2). It has an elevated location on the slope of the Toyabe Range, and is the centre of a productive mining region. Population, in 1890, 1215; in 1900, not given.

AUSTIN. The capital of Texas, and county-seat of Travis County, 186 miles west by north of Houston, on the north bank of the Colorado River, which, in its lower course, is navigable for steamboats, and on the Houston and Texas Central, the International and Great Northern, and the Austin and Northwestern railroads (Map: Texas, F 4). It is about 40 feet above the river, and is well built, with wide and shaded streets.

Capitol Square (10 acres) contains the capitol building, of granite, which cost $3,500,000, and is the largest State capitol in the United States. Other prominent structures are the State land office, county court-house, and the buildings of the State University. There are also the State asylums for the insane, the blind, and the deaf and dumb; institutions for the colored deaf, dumb, and blind; Saint Edward's College; Tillotson Institute (colored); several seminaries and academies. Two bridges span the river, and in 1893, a great dam, one of the largest in the world, was built 2 miles above the city, to provide water and power. But the dam proved a failure, being carried away by a flood. (See Dams and Reservoirs.) The export trade in agricultural produce, live stock, cotton, grain, wool, and hides is very large; and an extensive wholesale trade in groceries, dry goods, drugs, provisions, etc., is carried on. The manufactures include planed lumber, flour, and tanned leather. The government is administered under a revised charter of 1901, by a mayor, elected biennially; a city council, elected one-half by wards and one half at large; and municipal officials, of whom the sanitary inspector, police, pound-master, bridgekeeper, and hospital matron are elected by the council, and all others by popular vote. The water-works and electric-light plant are owned and operated by the city. Austin, originally called Waterloo, was in 1837 named after Stephen F. Austin (q.v.); was incorporated, and then made the capital of the Republic of Texas in 1839; and later became the permanent capital of the State. The first free school in Texas was established here in 1871. Population, in 1890, 14,575; in 1900, 22,258.

AUSTIN, Alfred (1835—). An English poet, born May 30, 1835, at Headingley, near Leeds. He graduated at the University of London, in 1853, and was called to the bar in 1857, but abandoned law for literature. After writing much for other periodicals, he became editor of the *National Review* in 1883. He was made Poet Laureate of England in 1896. Among his many volumes of verse, are *The Season: A Satire* (1861); *Savonarola*, a tragedy (1881); *English Lyrics* (1890); *The Conversion of Winckelmann and Other Poems* (1897); *Songs of England* (new ed., 1900), and *A Tale of True Love and Other Poems* (1902), dedicated to President Roosevelt. Austin attracted much notice in 1870 by an essay entitled *The Poetry of the Period*, in which he severely criticised Tennyson, Browning, and other Victorians. As a critic he is original and interesting, and although he has not the imagination of the poets whom he attacked, he has written some graceful verse. He has also published *The Garden that I Love* (1894) and *In Veronica's Garden* (1895)—two pieces in prose interspersed with short poems.

AUSTIN, Jane Goodwin (1831-93). A novelist who dealt with colonial New England. The more noteworthy of her romances are *Fairy Dreams* (1860), *Moonfolk* (1874), *Mrs. Beauchamp Brown* (1880), *A Nameless Nobleman* (1881), *The Desmond Hundred* (1882), *Nantucket Scraps* (1882), *Standish of Standish* (1889), *Betty Alden* (1891), and *David Alden's Daughter and Other Stories* (1892).

AUSTIN, John (1790-1859). The most distinguished of English writers on jurisprudence. He was born at Creeting Mill, in Suffolk, England, on March 3, 1790. At the age of 16 he entered the army and served as a subaltern in Sicily and elsewhere for five years. Resigning his commission, he returned to London and took up the study of law, and in 1818 was called to the bar. In 1820 he married Miss Sarah Taylor, of Norwich, a gifted woman, to whose devotion, courage, and steadiness of purpose he was indebted for the few but remarkable achievements of his life. In the same year he went to live in Westminster and was a welcome member of the circle to which belonged Jeremy Bentham and James and John Stuart Mill, and many others of the foremost minds and characters in England. But his great social and conversational gifts did not bring him success at the bar, a natural infirmity of will and deficiency of courage being aggravated by weakness of constitution and frequent attacks of fever and debility. Accordingly, he retired from practice in 1825, and the following year, upon the establishment of the University of London, he received the appointment of professor of jurisprudence in that institution.

This was before the period of the scientific study of the law in England, and her lawyers had not yet become aware of the existence of the science of jurisprudence. Hence his unrivaled powers of analysis and classification received scant recognition, and his work resulted in disappointment and apparent failure. To prepare himself for his task, he went to Bonn, then the principal seat of juristic learning in Europe, and spent the winter reading and studying under Niebuhr, Brandis, Schlegel, Arndt, Welcker, and Mackeldey. Returning in the spring of 1828, he began his lectures at University College. His earnestness and enthusiasm were not adequate to render his precise and accurate definitions and his profound and refined reasoning attractive to the professional students of law, and it soon became evident that there was no demand for the scientific teaching of jurisprudence. The number of his students dwindled to a mere handful. Unfortunately, no provision was made for the chair of jurisprudence beyond class fees; and in the absence of students, Austin, in 1832, was reluctantly compelled to resign his appointment. In the same year, he published his *Province of Jurisprudence Determined*, a work at the time little appreciated by the general public, so that the slight success it met with did not encourage him to undertake other publications on the subject. In the estimation of competent judges, however, it placed its author in the highest rank among writers on jurisprudence. In 1833, he was appointed by Lord Brougham a member of the criminal law commission. The post was not much to his taste, as he did not believe that the public received any advantage from such bodies, in the efficacy of which for constructive purposes he put no faith.

In 1836, he and his friend and pupil, Sir George Cornewall Lewis, were appointed commissioners to inquire into the laws and usages, the administration and state of government of the island of Malta, a congenial task which was performed with remarkable ability and thoroughness. But again his health broke down, and in 1838 he returned to England, only to be ordered abroad by his physicians. The next ten years were spent on the Continent, but the Revolution of 1848 drove him back to England. He then settled at Weybridge, in Surrey, where he lived until his death in December, 1859. His lectures on the principles of jurisprudence had remained in manuscript and were left by him in a fragmentary and imperfect state. It is due to the intelligence and zeal of his widow that they were subsequently collected and arranged for publication and in 1863 given to the world under the title *Lectures on Jurisprudence, Being the Sequel to "The Province of Jurisprudence Determined,"* of which latter she had published a second edition in 1861. On this work his fame now rests.

Austin's great merit consists in the remarkable clearness and penetration of his analysis of legal conceptions. He was the first English writer to attach precise and intelligible meaning to legal terms, as well as the first systematic writer on law in the English language. With an adequate knowledge of the principles and methods of Roman and English law, he combined an extraordinary talent for classification and definition. Fragmentary and incomplete as it was, his work revolutionized the science of jurisprudence and became the text-book of the school of analytical jurists, which has dominated the legal thought of the Nineteenth Century in England and America. His doctrines have had but little influence elsewhere, however, the Continental jurists adhering with singular unanimity to the classification and conceptions of the Roman law. Indeed, even in the Anglo-Saxon world, a reaction has lately set in against the Austinian conceptions of law and politics, owing to the enlarged knowledge of human society and the historical spirit which have so profoundly modified the thought of our generation. Austin's limitation of the conception of positive law to the commands of a sovereign, and his restriction of sovereignty to an external political authority, have been especially subjected to criticism. They are, however, reasserted and strongly defended by his most distinguished disciple, Prof. Thomas E. Holland, in the latest edition (1900) of his *Elements of Jurisprudence.* For the opposite view Sir Henry S. Maine's works may be consulted, especially *Early Law and Custom* (London, 1883), and *Early History of Institutions* (London, 1875). The pathetic story of Austin's life is related by his widow in her introduction to the second edition of his *Province of Jurisprudence Determined* (London, 1861); and John Stuart Mill has included a sympathetic but just and discriminating criticism of the man and his work in his volume *Dissertations and Discussions* (4 vols., London, 1875). See Jurisprudence; Law; Sovereignty.

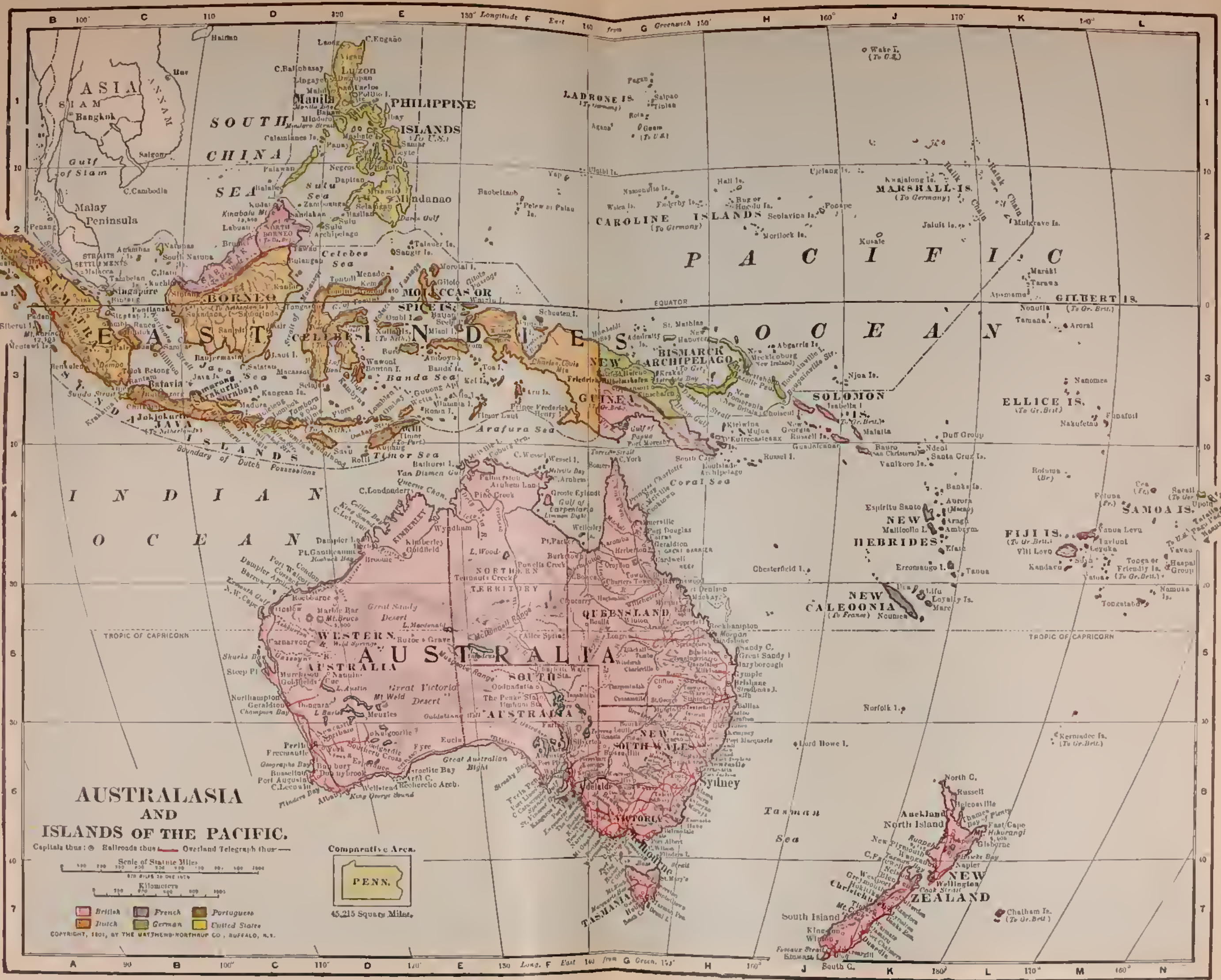
AUSTIN, Jonathan Loring (1748-1826). A diplomatic agent of the United States in Europe during the Revolutionary War. He was born in Boston, graduated at Harvard in 1766, and engaged in trade at Portsmouth, N. H. In 1775 he entered the American Army as a major, and for a time was one of General Sullivan's aides. He also served as secretary of the Massachusetts Board of War, and in October, 1777, was sent to Paris by Massachusetts to announce to Franklin and his associates the news of Burgoyne's surrender at Saratoga. Franklin soon afterwards sent him on a singular secret mission to England, where he met many members of the opposition and furnished them with much information concerning American affairs. The trip was full of incident, and, says one of Franklin's biographers (Morse), "brings to mind some of the Jacobite tales of Sir Walter Scott's novels." He carried dispatches to Congress from the United States Commissioners in Paris early in 1779, and in January, 1780, was dispatched to Europe to secure loans for Massachusetts in Spain and Holland, but failed in his mission, and was captured and held for a short time by the British. Late in 1781 he returned, and subsequently held various State offices of more or less importance.

AUSTIN, Sarah Taylor (1793-1867). An English translator and author, the wife of John Austin. She was born at Norwich, a member of a family remarkable for the men and women it has produced distinguished by literary and scientific ability. She spent several years abroad, enjoying the friendship of many eminent persons in Continental society. She translated, from the German: *Characteristics of Goethe,* by Falk, and others, with notes (1833); *The Story Without an End,* by Carové (1834), and Ranke's *History of the Popes* (1840). Though Mrs. Austin did some original work, as *Germany from 1760 to 1814,* she is chiefly known as an excellent translator. Consult the London *Athenæum* for August 17, 1867.

AUSTIN, Stephen Fuller (1793-1836). An American pioneer and politician, known as the founder of the State of Texas. He was born in Wythe County, Va., the son of Moses Austin, who originally, from Connecticut, projected the Texan colony which was finally established in 1821 by his son, on the site of the present city of Austin. The latter, by his energy, ability, and hardihood, made the experiment a success; and other colonists settled in the vicinity, until the Americans became so numerous that they held a convention in March, 1833, to form a separate State government. Without heeding the Spanish population they agreed upon a plan, and Austin took it to the City of Mexico to obtain its ratification; but a revolution there prevented a hearing, so he wrote advising the Texans to form the State government without waiting for the consent of the Mexican authorities. This cost him three months' imprisonment and a longer surveillance; but in 1835 he returned to Texas, and took command of the small Revolutionary Army. In November he went as commissioner to the United States, and endeavored to obtain the recognition of Texas as an independent State. He returned late in 1836, and died on December 27. Consult Yoakum, *History of Texas* (New York, 1856).

AUSTIN, William (1778-1841). An American lawyer and author, born in Massachusetts. In addition to *Letters from London* (1804), *An Essay on the Human Character of Jesus Christ* (1807), and several minor works, he published the legendary tale of *Peter Rugg, the Missing Man,* in the *New England Galaxy* (1824-26). Consult *Literary Papers of William Austin,* with a biographical sketch (Boston, 1890).

AUSTIN FRI'ARS. A monastery in old London, on Broad Street, built by the Earl of Hereford and Essex in 1253-54, and holding the tombs of various historic characters. When the Order of Augustine, for which it was erected, was dissolved, at the end of the Sixteenth Century, the building suffered various alterations, the spire being razed and the nave walled up.



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The Dutch residents of the city now worship there. See AUGUSTINIANS.

AUSTRALASIA, as′tr*a*l-ā′shĭ-ȧ (Neo-Lat., Southern Asia, from Lat. *australis*, southern + Asia). A geographical term of rather loose application, used by some authorities to denote all the islands of the Southern Pacific, including Australia, New Guinea, New Zealand, and Melanesia (q.v.); while others confine it to Australia, Tasmania, New Zealand, and the Fiji Islands.

AUSTRA′LIA (Neo-Latin, Southland, from Lat. *australis*, southern). The island-continent lying to the southeastward of Asia and the East Indies. It is situated wholly within the southern hemisphere, between latitudes 10° 41′ and 39° 11′ S., and between longitudes 113° and 153° 40′ E. It is irregularly oval in shape, with the south side concave. The greatest length is along the middle parallel, at about 25° south, and is nearly 2500 miles; while the greatest breadth, which is in the eastern part, in longitude 143°, is about 1950 miles. Its area is 2,972,906 square miles. Australia is bounded on the north by the Timor Sea, Arafura Sea, Gulf of Carpentaria, and Torres Strait, 80 miles wide, which separates it from New Guinea; on the east by the Coral Sea and the Pacific Ocean; on the south by the Pacific, and on the west by the Indian Ocean. The coast contour is exceedingly regular, the total length of the coast line being about 10,600 miles, or little more than its general contour. On the north there are two considerable indentations, Queen Channel, a part of Timor Sea, and the deeply penetrating Gulf of Carpentaria. Stretching along the eastern coast from near Cape York in latitude 11° S. to Sandy Cape, latitude 24° S., lies the Great Barrier Coral Reef. The great inward bend on the southern side of the continent is known as the Great Australian Bight. Off the southeastern point of Australia, and separated from it by Bass Strait, 140 miles wide, is the island of Tasmania, the only large island commonly associated with Australia. The coast of Australia offers comparatively few good and accessible harbors.

TOPOGRAPHY. Of all the continents, Australia presents the least relief, both in total altitude above the sea, and in diversity. Viewed broadly, the interior is a plain, rising from west to east and from south to north, and bordered near the east and west coasts by mountain ranges. The mean elevation of the continent is estimated at 1300 feet. Near the east coast, stretching from the neighborhood of Melbourne, Victoria, in the southeast, to Cape York in the northeast, are the mountains of the Great Dividing Range, known locally by many names, as the Australian Alps, the Blue Mountains, New England Range, etc. This mountain system separates the waters flowing to the eastern coast from those which flow to the interior and the southern coast. It is by far the highest, broadest, and most complicated of the ranges on the island. Its breadth and the distance of its main crest from the coast differ widely in different places. In Victoria, the southeastern province, the seaward slope ranges from 50 to 75 miles in breadth, in New South Wales, from 30 to 120 miles, while in Queensland, the northeastern province, it reaches 300 miles in some places. The southernmost section of the Great Dividing Range extends in a general west and east direction through Victoria, with many spurs and mountains of considerable elevation, including Kent, 5129 feet; Howitt, 5715 feet; Hotham, 6100 feet; and Bogong, 6508 feet. Lapping the northeastern end of this range on the seaward side, and extending into New South Wales, with a northeastern trend, are the Australian Alps. These contain, in the Kosciusko group near the boundary line between New South Wales and Victoria, the highest peaks in the system and in Australia; Mount Kosciusko has an altitude of 7336 feet and Mount Townshend of 7352 feet. From the north end of the Australian Alps, the divide is carried coastward by the short and comparatively low Monaro Range, and is taken up again by the Gourock Range, parallel with the coast, which here trends nearly north. Here the system becomes more complicated, with secondary ranges on either side of the dividing range. The divide is carried northward by the Cullarin Range and the Blue Mountains, from which long spurs, extensive enough to be dignified by the name of ranges, extend on the one hand to the coast, and on the other far into the interior. Among the ranges extending to the coast are the Hunter and the Mittagong, while the Mundoonen and the Macquarie are the principal ranges which extend into the interior.

Farther north the main crest is known as the Liverpool and the New England ranges, and under the latter name the system reaches the southern boundary of Queensland. Here are Oxley Peak, 4000 feet; Chandler Peak, 4500 feet; and Ben Lomond, 5000 feet. In this stretch are spurs running to the coast under the names of Hastings Range, with Seaview Peak, 6000 feet high; Macleay Range, and McPherson Range, with Mount Lindsay, 5500 feet, and Mount Gipps, 4500 feet. Stretching westward into the interior are the Warrumbungle and Nundewar ranges. In Queensland the system becomes broader and more complicated, but, on the whole, is not so high. The dividing range, under the names of Craig and Benham ranges, swings far to the westward, to surround the headwaters of Fitzroy River, leaving between its crest and the coast numerous low ranges, which separate the branches of this stream. Farther north the system becomes broken, being made up of many short, disconnected ranges, in which form it runs down York Peninsula near the east coast. Along the western coast of Australia the Darling Range stretches from Cape Leeuwin to Shark Bay, trending a little west of north, and parallel to the coast. It is a low range, the highest point being only 1500 feet above the sea. Farther north are numerous other low ranges, arranged *en échelon*, and running down to the coast; so the west coast, although not paralleled by a single range, as is the east coast, is closely bordered by mountains, not, however, of great height. The interior plain is diversified by a number of low ranges and plateaus. Probably none of the summits reaches 5000 feet in altitude, and most of them are much below this height. On the whole, the interior is a region of but little relief. The lowest portion is a broad area stretching from the head of Carpentaria Gulf on the north to Spencer Gulf on the south. In this region the land nowhere rises above 500 feet, and in the southern part is little, if any, above sea level.

Hydrography. In its hydrography, Australia is peculiar, in the fact that two-thirds of its area—indeed all of it, excepting strips of varying breadth on the east, north, and west coasts—has no drainage to the sea. In all this vast region of nearly 2,000,000 square miles, comprising the whole interior of the continent, and most of the southern coast strip, the scanty rain that falls is absorbed by the thirsty soil. In this region are rivers of great length, which, in rainy seasons, may be of considerable volume, but the desert sands absorb their entire flow. On the east or seaward slope of the Great Divide are many short rivers, but none of them are of importance for navigation, as they run very low at times. Among them are the Brisbane, Burnet, Titnoy, Burdekin, Herbert, Normanby, and Kennedy. The only river rising in the west side of this mountain system which reaches the sea is the Murray, with its great branch, the Darling; this is far the largest stream of the continent, having a drainage area of 300,000 square miles; with the Darling, it is navigable at high water for 1700 miles. The Murrumbidgee, another large branch, is navigable for 500 miles at high water. The south coast for nearly 1000 miles has no stream flowing to the sea. On the west coast the streams are short, and are dry, except in the rainy season. On the north coast the principal streams flow into the Gulf of Carpentaria; these are the Leichman, Flinders, Roper, Gilbert, and Mitchell. Into Queen Channel flows the Victoria, while farther north are the Adelaide and Daly rivers. All these streams are long, but are torrential in character, and of no value for navigation.

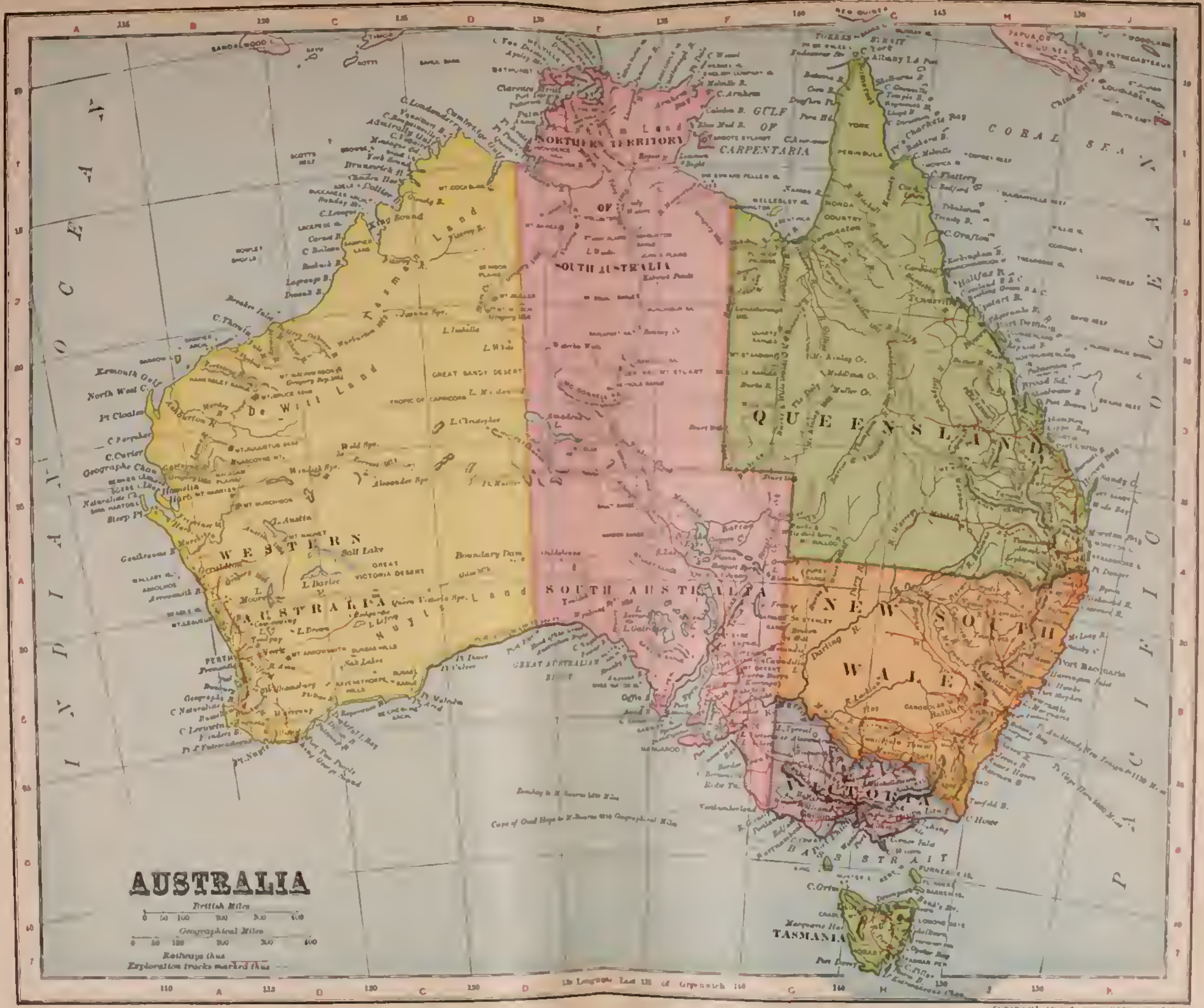
The rivers of the interior, though of no service as means of communication, may be put to use for irrigation purposes as settlement progresses; among them are the Cooper and Macumber, flowing into Lake Eyre, the first of which is not less than 1200 miles in length, the Herbert, and Diamantina. There are many salt lakes in the interior, which serve as sinks for the streams which flow into them. The largest of these is Lake Eyre, in South Australia, which receives the waters of many streams from a large area of surrounding country. Its surface is said to be a few feet below sea level. South of it are lakes Torrens and Gairdner, and far to the northwest is Lake Amadeus.

Geology. The Great Dividing Range is composed mainly of Silurian beds, with, however, large areas of Carboniferous formation, while in the neighborhood of Sydney and Ipswich, New South Wales, are large areas of what are probably Jurassic beds. Throughout the range intrusions of granite are abundant. The Darling Range, on the west coast, is composed of more recent beds, probably Jurassic. East of this range, stretching far into the interior, the country is overlaid irregularly with granite, and the same rock appears in many, if not most, of the mountain ranges of the interior, breaking through the Tertiary and Cretaceous beds which floor the plains and plateaus of this region. The distribution of these last two formations in the interior may be broadly characterized by the statement that the interior portions of Queensland and New South Wales are underlain mainly by Cretaceous beds, while the interior of Western and South Australia is mainly covered with Tertiary formations. There are, however, considerable tracts in the interior which are covered by older rocks. Thus, in the southern part, north of Spencer Gulf and the Gulf of Saint Vincent, is a large area of Palæozoic beds extending inland as far as Lake Eyre, while from the head of the Gulf of Carpentaria an area of the same age extends southward. Tasmania is composed mainly of Silurian strata; Carboniferous and Jurassic beds and older crystalline rocks appear, however, both in the interior and on the east coast. Gold-bearing rocks and other valuable mineral deposits are widely disseminated throughout Australia.

There are no active volcanoes on the continent, but there are several areas of extinct volcanoes. They are very numerous in the State of Victoria in the southeast, where they have had much to do with shaping the present conformation of the land. There are but few in New South Wales, although outflows of basalt through low vents were numerous and extensive in that colony during Tertiary times. In Queensland the volcanic area is extensive, especially in the interior. In South Australia is the well-known volcanic group which has Mount Gambier for its central figure.

Climate. Australia lies half within the tropics, and half within the South Temperate Zone; while it has a wide range of temperature and rainfall, this is not attributable to the range in latitude, but to the topography of the continent. The rainfall is heaviest upon the north and east coasts, while upon the south and west coasts, except upon the southwest corner of the continent, and the eastern part of the southern coast, it is light, and throughout the interior it is almost wanting. Thus only a small part of the whole area has sufficient rain for agriculture. The northern part of the east coast enjoys a tropical rainfall amounting to 80 inches or more annually; southward it diminishes, being 50 inches at Sydney, and at Melbourne 25 inches. The rainfall diminishes inland along the whole coast. The east coast of the Gulf of Carpentaria has about 40 inches, while the west coast has 50 inches or more. Most of the south and west coasts have less than 20 inches, while most of the interior has less than ten inches. The rainfall is exceedingly irregular in all parts of the island, even upon the east coast, and the streams are correspondingly torrential in character. Most of the moisture brought to the island comes with the trade winds from the southeast, and is of course deposited on the east and north coasts, whose mountain ranges strain nearly all the moisture from the air currents, leaving them to flow as dry winds over the plains of the interior. The moisture in the southwest and in the State of Victoria on the south coast, on the other hand, is brought by the prevailing westerly winds, whose influence extends up the west coast only as far north as Perth.

Australia presents also extremes of temperature. The east coast has a fairly uniform temperature, the mean annual temperature ranging from 80° in the north to 55° in the south, and with a range between the monthly means of July and January of only 15° to 20°. On the other hand, in the interior, while the mean annual temperature ranges with the latitude from 60° to 80°, the contrast between summer and winter is great, reaching 40°, while the mean



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temperature of the hottest month is 95°. In this region very high temperatures are reported, 128° in the shade having been recorded. Sudden and great changes are common. The thermometer has been known to fall 60° or 70° in a few hours.

Flora. The flora of Australia as a whole is very distinctive, and, moreover, is of two very marked and characteristic types: That of the moist east and north coasts, which is tropical in its luxuriance, and that of the interior, and the south and west coasts, which is that of the desert. Upwards of 12,000 species of plants are found, of which number not less than 7000 are peculiar to the continent. The leaves of many of the plants are of tough, fibre-like consistency, and some of them are needle-shaped; thus rapid evaporation is prevented, for they do not collect the heat rays as do the broad-leaved plants. The foliage is somewhat monotonous after the manner of regions where specific types prevail. Australia possesses a great extent of territory in which the soil would produce a rich vegetation if only the proper watering could be accomplished.

Eastern and northern Queensland, with its moist tropical climate, produces a dense plant growth of Indo-Malayan character, such as tree ferns, bamboos, palms, and canes, with numerous parasitic plants and orchids. The palm and the pandanus (of the screw-pine family), with their aërial roots and palmy branches, are distinctive forms of this section. The bottle-tree also, with its curious shape, deserves mention. The grass tree is also found in the eastern Australian region. In Victoria the vegetation is almost tropical in its richness in the mountain regions, but on the plains is somewhat sparse, the trees growing in park-like clumps. Here the eucalyptus reaches its greatest height (exceeding 400 feet), tree ferns present their wonderful growth, and numerous small ferns aid in giving a peculiar aspect to the vegetation. Fan palms and acacias also flourish. Grass and salt brush are distinctive types of lowland flora. In that great central region known as South Australia and Northern Territory there is a sparse vegetation, the scrub or mallè being general, together with sedges, grasses, etc., as well as the grass tree, thorny plants, and a stunted growth of eucalyptus. Thickets of the paper-bark tree also occur. This growth, known as the 'Bush,' is impenetrable by man in some regions. On the coast are found mangoes.

In July (mid-winter) the following vegetation conditions prevail: in Northern Australia, along the borders of the Gulf of Carpentaria, the vegetation is tropical in character with no cessation of the growing period. To the south of this, all along the northern part of the continent, is a less rich tropical vegetation with a cessation during the dry season. In the southern part of the eastern coast and the eastern and western parts of the southern coast are evergreen trees and a bushy growth, with a short period during which vegetation is at a standstill. In the remainder of the continent are grass lands, bushy steppes and desert areas in which the vegetation rests at this time of year (the winter time of the Southern Hemisphere). In January (mid-summer) on the northern coast the narrow strip of rich tropical vegetation suffers no interruption in growth, and in the belt of less rich tropical vegetation to the south of it, vegetation is in its full development during the rainy season. The vegetation in the southeastern and southwestern parts is much restricted by the summer drought. In the interior the steppes have their summer verdure in regions where there is sufficient rain, but in the southwest the principal season of vegetative growth is from September to October, during the southern spring.

Fauna. The animal life is more peculiarly isolated than is that of any other great region of the globe. Of the non-aquatic mammalia only two of the orders found on the other continents are represented, the bats and the rodents. The others have their places taken by the two orders peculiar to Australia, the marsupials or pouch mammals, and the Monotremata or egg-laying mammals. There are six families of marsupials which include about 30 species. They differ greatly in form, in appearance, and in habits, resembling wolves, marmots, weasels, squirrels, flying squirrels, and jerboas, and feeding on flesh, insects, roots, fruits, honey, leaves, and grass. The flesh-eaters are the native cats, rats, and mice, which are common to the continent, and the larger species, the so-called tiger of Tasmania. The insect-eaters are the bandicoots or bandicoot-rats. The root-eaters are the wombats, all large burrowing animals. The fruit-eaters are the native bear, a sloth-like creature, three varieties of opossums, the flying opossums, and the flying squirrels. The grass-eaters are the kangaroos, of which there are numerous genera; the large kangaroos, the small kangaroos, the rock wallabies, and the hare kangaroos. The Monotremata, the egg-laying mammals, are the Ornithorhynchus and the spiny ant-eater; the former of which, with its otter-shaped body and duck bill, is regarded as the most unique of existing mammalia. It is not certain that the dingo or wild dog is a native of Australia, although he is a characteristic mammal at the present time. Among the bats are some which attain great size and are called flying foxes, and which feed on fruits; others of smaller size live on insects. The bird fauna has numerous species. Among the larger birds are the emu, the eagle, and the black swan. The lyre-bird is remarkable for its peculiar plumage. Paradise birds, cockatoos, parrots, paroquets, snipe, quail, pigeons, ducks, plovers, falcons, honey-suckers, scrub birds, mound-makers, shrikes, weaver finches, kingfishers, frog-mouths, and flower-peckers are all abundant. Many of these birds exhibit peculiarities of appearance or habit not noticed elsewhere, and the reasons for which may be found in the peculiar conditions existing in Australia as regards its geographical characteristics.

The reptiles of Australia are less distinctively peculiar than the birds and mammals. No families of snakes are confined to this continent, but there are some peculiar genera of Pythonidæ and Elapidæ, to which latter family fully two-thirds of the snakes of Australia belong. These are poisonous; so that Australia has more poisonous snakes in proportion to the total number than has any other region. In Eastern Australia about half the snakes are poisonous, but in other parts the ratio is not so high. The number of species increases very rapidly from the southern part toward the northern with the increase in temperature. Lizards are numerous; three of the eight families occurring being peculiar to Australia. Tailed amphibians are not found in Australia, but eleven families of toads and frogs are present. There is only one family of fish peculiar to the waters of Australia, but many genera are found there which do not occur elsewhere. Australia is relatively poor in insect life. The butterflies are by no means numerous: in South Australia there are less than 35 species, although in Queensland there are over 100. This continent is much richer in beetles than in butterflies, the longicorns being especially abundant.

MINERAL RESOURCES. No other single factor has played so important a part in the industrial upbuilding of Australia as her gold mines. Gold drew immigrants to the country; led to a more extensive exploration; established a home market, and led to civilization. Gold was officially reported as early as 1823, yet the gold fever struck the country only in 1851. New South Wales was the scene of the first activity, but within a year there was a rush to the Ballarat district of Victoria, and seven years later to the Canoona district of Queensland. Western Australia was thought to be destitute of the precious metal, and it was not until the nineties that the rush to the Coolgardie districts (300 miles east of Perth) set in. Mining of any consequence in Tasmania began in 1870. South Australia, alone, has failed to contribute largely to the supply of gold. The following table shows the total value of gold obtained in the different States to the end of 1899:

STATE	TOTAL PRODUCTION OF GOLD UNTIL THE END OF 1899			PRODUCTION IN 1899	
	Amount Produced				
	Value	Alluvial oz.	Quartz oz.	Value	Miners Employed
New South Wales	$ 237,000,000	91,477	404,719	$ 8,000,000	19,348
Victoria	1,271,000,000	270,405	584,095	17,000,600	30,114
Queensland	236,000,000	21,794	925,100	14,000,000	9,758
South Australia	11,000,000	....	....	400,000	1,986
Western Australia	84,000,000	63,208	1,580,699	31,000,000	21,000
Tasmania	21,000,000	11,573	72,479	1,600,000	1,296
Total	$1,860,000,000	....	....	$72,000,000	83,502

It will be seen that Victoria has produced over two-thirds of the total product, while New South Wales and Queensland follow with 12 per cent. each. Victoria had led constantly until 1897, when she was outstripped by Western Australia, and the output of the latter State in 1899 was nearly double that of the former, although Victoria's output in that year was the greatest since 1882. In this State, as in the others, improved processes (see GOLD) and appliances for obtaining both the alluvial and quartz deposits are resulting in a revival of the mining industry. The yield in Queensland for 1899 was the highest on record. The yield in New South Wales exceeded $10,000,000 in 1852 and again in 1862, but after the latter date it greatly decreased until 1888. From 1888 it has constantly increased. The Government, particularly in Victoria, has been very active in furthering the industry. At many points throughout the gold-mining region, and in Western Australia especially, the scarcity of water has been a serious obstacle. It has sometimes been necessary to conduct water great distances; but, of late, means are being devised for storing and utilizing the abundant fall of the short rainy season, and often an adequate subterranean sup-

MINERAL PRODUCTION OF AUSTRALIA

STATE	1871	1881	1891	1899
New South Wales	$ 8,250,000	$10,605,000	$31,980,000	$30,405,000
Victoria	27,000,000	17,335,000	11,605,000	17,895,000
Queensland	4,030,000	15,825,000	11,500,000	15,700,000
South Australia	3,625,000	2,105,000	1,830,000	2,580,000
Western Australia	25,000	55,000	650,000	31,730,000
Tasmania	125,000	3,020,000	2,580,000	12,695,000
Commonwealth	$43,055,000	$48,945,000	$60,235,000	$111,005,000

MINERAL PRODUCTION IN 1899

STATE	Gold	Silver and Silver Lead	Copper	Tin	Coal	Other Minerals	Total
New South Wales	$ 8,755,000	$10,350,000	$1,975,000	$ 450,000	$6,625,000	$2,230,000	$30,405,000
Victoria	17,090,000	50,000	....	55,000	565,000	125,000	17,895,000
Queensland	14,190,000	75,000	45,000	385,000	875,000	115,000	15,700,000
South Australia	395,000	2,000	2,030,000	900	....	150,000	2,580,000
Western Australia	31,230,000	....	185,000	125,000	100,000	60,000	31,730,000
Tasmania	1,635,000	1,885,000	5,135,000	1,135,000	85,000	1,590,000	12,695,000
Commonwealth	$73,295,000	$12,362,000	$9,370,000	$2,150,900	$8,250,000	$4,270,000	$111,005,000

ply is found. The number of Chinese among the mining laborers is rapidly decreasing. The total gold product of the Commonwealth doubled during the last decade of the Nineteenth Century, and was almost as great as that of either the United States or the Transvaal, her only rivals.

The rich deposits of iron ore which are generously distributed over the continent have as yet been little worked; but an effort is being made to stimulate both iron manufactures and iron mining. The greatest advance has been in New South Wales, where rich ores are found in close proximity to coal and limestone. Other metals mined in small quantities are antimony, bismuth, manganese, platinum, and lead, the last-named being produced only in connection with silver mining. Building stone and commercial clays are abundant, and are drawn upon as local needs require. Diamonds and numerous other precious stones are found, but not extensively. The mineral fuels of Australia consist principally of bituminous coal. Over 90 per cent. of the total has been produced by New South Wales. Only in the United States is a larger amount of coal mined per capita. The value of the annual production of the Commonwealth is close to $10,000,000. The accompanying table shows the total mineral production by States in successive decades.

Although gold still constitutes the chief mining product, its relative importance in the mining industry is declining. Silver and silver-lead mining first became important in 1882. Its production has been almost wholly confined to New South Wales, the maximum output ($18,000,000) being attained in 1891, when it exceeded the value of gold produced. But it has since fallen off almost one-half. For a few years past silver mining has rapidly developed in Tasmania. Copper ranks almost on a par with silver, and has been extensively mined for a much longer period. Seventy per cent. of the total copper product of the country is produced in South Australia, where it is the only mineral extensively mined. New South Wales has produced about 16 per cent. of the total output. Owing to the depreciation in price, the production in both of these colonies greatly decreased after 1884; but there has recently been a revival in the industry, and the figures recorded above for 1899 are the highest reached in 15 years. Still, South Australia is no longer preëminent in the copper-mining industry, Tasmania having had a remarkable development in the last five years, surpassing the former State in 1897, and in 1899 exceeding her three to one. Tin is the only other metal mined in large quantities, the most important producers being Tasmania, New South Wales, and Queensland, in the order named. The mining of this metal varies greatly from period to period, in consequence of the great fluctuations in prices. Thus far the mining has been confined almost wholly to the alluvial deposits, although there are lodes of unusual richness.

Agriculture. The agricultural development of Australia has been governed by the remoteness of the continent from the rest of the civilized world, by the recent date of its settlement, and naturally by the peculiarities of its physical and climatic conditions. Its latitude and its contour are such that it is nowhere subject to extremes of cold, and is well adapted to the production of tropical and temperate zone products. But a very small portion of its area is occupied by mountains and thus rendered uncultivable. The absence of mountains, however, is probably more of a loss than a gain, for it is responsible for a light rainfall in a very large portion of the continent, and also for the occasionally destructive hot winds. In the western half of Australia, save at favored points along the coast, the rainfall is too scant to justify cultivation. The value of the rainfall is greatly lessened, moreover, by the fact that it falls in torrents, and is mostly carried away at once by the watercourses. But the western desert has lost many of its horrors, as it has become more intimately known and methods of overcoming its disadvantages have been discovered and applied. Surface streams for irrigation are not plentiful, but there are an unusually large number of subterranean currents; also many artesian wells have been bored, particularly in South Australia, and western New South Wales and Queensland, and numerous localities have thus been brought under successful cultivation. But as yet most of the western half of Australia lies untouched, while most of the eastern half resembles our western plains of half a century ago, being given over entirely to grazing.

This latter region has proved second to none anywhere in adaptability to sheep raising. Even the forest areas afford excellent pasturage; and the winters are so mild as not to interfere with grazing the year round. The only serious drawback is an occasional drought. For several years Australia has led the world as a wool producer, and her sheep have been her greatest source of wealth. The number of her sheep is nearly twice that of the United States, and the colony of New South Wales alone at one time outranked us, having, in 1891, nearly 62,000,000 head, or three-fifths of the total in Australia. Sheep increased steadily until 1891, when over 106,000,000 were reported, since when there has been an equally remarkable decrease in three of the States—New South Wales, Queensland, and South Australia. Sheep are raised mainly for the wool, the total amount of which, in 1899, was 467,800,000 pounds. While the wool crop has been continually declining during the last decade, there was no corresponding decrease in value, for the scarcity had caused a rise in price. The breed of sheep is steadily improving, as is shown in the increase of the average weight of clip per sheep from less than 4 pounds in 1861 to nearly 6¼ in 1899, about one-quarter pound less than in the United States. Formerly little or no mutton was exported, due to the breed of sheep and the distance from European markets. But with the improvement of the breed and the discovery and application of a process of cold storage of the meat for transportation, an export trade is being established which promises to become of great importance.

Cattle are no less favored by the Australian climate than sheep. Queensland is the great cattle-raising State. There this industry takes precedence of sheep-raising, and is greater than in all the other States combined. The number of cattle in the Commonwealth increased steadily from 3,846,000 in 1861, to 11,029,000 in 1891, since when the number has decreased, being only 9,838,000 in 1899. The exportation of cold-storage beef is much greater than of mutton, and is constantly increasing. Dairy farming has been developed almost wholly during the last decade. The State governments, particularly in Victoria, have encouraged the establishment of creameries and the exportation of butter with satisfactory results. An improved method of shipping has been another favorable factor. The raising of swine is very limited, but is developing in connection with dairy farming. Horses are bred mainly for local purposes. The small, yet hardy, breed called 'bush horse' predominates. In 1899 their total number in Australia was 1,670,000. There has long been a small export trade to India, and during the British war with the Boers in South Africa the exportation of horses was greatly stimulated.

While stock breeding has been declining, there has been a more and more active cultivation of the soil, particularly for wheat raising. During the decade preceding 1891, in which there was a remarkable growth in stock raising, land cultivation increased but slightly; but in the subsequent decade, the increase was enormous. A change from the pastoral to the agricultural stage is here taking place, similar to the transformation on our Western plains. Already the value of agricultural products is equal to one-half that of the pastoral and dairy products. The rate of increase of cultivated land since 1861 has been twice that of the increase of population. With the passing of the gold fever of earlier years, the people are settling down to farming life and realizing its great possibilities.

Land Under Cultivation

State	1861		1871	1881	1891	1899	
	Thousands of Acres	Acres per Capita	Thousands of Acres	Thousands of Acres	Thousands of Acres	Thousands of Acres	Acres per Capita
New South Wales	265	0.7	390	578	846	2,440	1.8
Victoria	410	0.8	851	1,435	2,116	3,155	2.7
Queensland	4	0.1	59	117	242	420	0.9
South Australia	400	3.2	837	2,156	1,927	2,238	6.0
Western Australia	24	1.6	51	53	64	186	1.1
Tasmania	163	1.8	155	148	168	225	1.2
Commonwealth	1,266	1.1	2,343	4,487	5,363	8,664	2.3

In the following table it will be seen that in the three leading agricultural States wheat constitutes much more than half of the total acreage, and is prominent in all but Queensland. Hay ranks next and is important in all the States. Only in Queensland and New South Wales is there sufficient rainfall to assure a crop of corn.

	New S. Wales	Victoria	Queensland	S. Australia	W. Australia	Tasmania
Acreage	1,426,166	2,165,693	52,527	1,821,137	84,516	64,328
Wheat (per cent.)	58.4	68.6	12.5	81.3	45.4	28.6
Corn	8.8	0.3	26.2	......	0.1	0.1
Barley	0.3	2.5	1.8	0.7	2.1	3.4
Oats	1.2	8.6	0.2	0.9	2.1	20.0
Potatoes	1.4	1.8	2.5	0.4	1.5	12.0
Hay	22.7	14.3	14.0	13.9	42.3	18.8
Vines	0.4	0.9	0.5	0.9	1.7	......
Sugar cane	0.9	......	26.3	......	......	......
Other crops	5.9	3.0	16.0	1.9	4.8	17.1
Total per cent.	100.0	100.0	100.0	100.0	100.0	100.0

The increase in wheat has been proportional to that of the total cultivated area, yet wheat is not a universally successful crop. In places droughts are frequent, and in many localities a long, unbroken succession of the one crop has impoverished the soil. The average yield per acre for the Commonwealth is less than that of almost any other country, being less than 8 bushels, as against 13 for the United States. The percentage of the total cultivated area devoted to vines, sugar-cane, and other crops (including fruits), has increased from 8.6 per cent. in 1861, to 14.3 per cent. in 1899. Sugar-cane is already by far the foremost crop of Queensland, and is important in New South Wales. Government bounties have greatly stimulated viticulture. It is found that wines of a superior quality can be produced. The cultivation of cotton, tried for a time, was given up on the discontinuation of the Government bounty. Coffee and bananas are successfully grown on the coast of Queensland, and all kinds of temperate zone fruits farther southward; while the orange, lemon, and fig thrive along almost the whole of the eastern shore line, even as far south as Victoria. The conditions for the production of any of these crops are scarcely excelled in any country. The part of the land so far cultivated is but a minute portion of that which is available. The eastward coast and mountain region of New South Wales alone might well be spoken of as the counterpart of California in area and in possibilities. Against the disadvantage of remoteness from the world's market, it has the advantage of producing fruits at a season when there is no competition from northern countries.

The different State governments have sought to encourage the more rapid development of the crown-lands, and the State laws have been adapted to the nature and possibilities of the land and the varying desires and financial conditions of the settler. The terms for acquiring new lands include various kinds of conditional purchases, the installment plan being in vogue. Sometimes residence is exacted. Certain lands may be acquired by annual lease, but there is a growing tendency to lease in perpetuity. (For a more detailed statement, see articles on the different States.) The States formerly assisted immigration, defraying in whole or part the expenses of transportation. At present, Queensland alone continues this plan. In this State farm laborers and female servants between the ages of 17 and 35 are free of transportation charges. Assistance is rendered also to other classes of immigrants.

Manufactures. Manufacturing is always one of the later industries to develop in a country. Australia has not yet reached this stage. The production of food products and raw materials has been so remunerative, and induced so high a standard of wages, that even the protective tariffs maintained by all the colonies except New South Wales, and the strenuous efforts put forth in other directions to the end that the manufacturing industry be developed, have not persuaded capital and labor to venture far on lines that would bring them in competition with the cheap labor and the well-established industries of Europe. Whatever manufacturing there is, therefore, is largely of the domestic or local type. The work done on a large scale is confined largely to the preparation of food products and raw materials for foreign shipment. The foregoing table represents approximately the number of people employed in the various industries of the Commonwealth, though the statistics of the various States on that subject are not uniform.

Number of People Employed in

Industries	New S. Wales (1899)	Victoria (1899)	Queensland (1899)	S.Australia (1899)	Western Australia (1899)	Tasmania (1898)
Treating raw material, the product of pastoral pursuits	2,690	1,942	1,502	400	22	133
Connected with food and drink, or the preparation thereof	9,356	9,657	9,023	1,990	1,008	641
Clothing and textile fabrics	10,984	17,728	3,795	2,927	1,147	473
Building materials	6,277	6,131	3,214	1,198	3,617	987
Metal works, machinery, etc.	11,901	9,423	4,013	6,629	1,745	316
Ship building, repairing, etc	1,499	168	183	81	27	......
Furniture, bedding, etc	1,701	1,446	676	32	160	......
Books, paper, printing, etc	5,064	6,168	2,108	989	782	647
Vehicles, saddlery and harness	1,950	2,312	1,445	541	406	300
Light, fuel, and heat	987	895	307	65	140	40
Miscellaneous	3,247	6,300	1,034	1,303	353	192
Total	55,646	60,070	27,200	15,155	9,407	3,629

Railways. One of the most serious problems with which Australia has had to contend is inland transportation. Being an almost riverless continent, she is mainly dependent on artificial systems. These must largely precede civilization and open up the country for industrial development. The construction of railways through uninhabited or sparsely settled regions necessitated an enormous cash outlay in the face of a light estimate of immediate returns, and an uncertainty as to the ultimate outcome. This burden and responsibility were assumed by the Government itself. It has sought to further the development of the country and at the same time reap the benefits of the growth occasioned by the construction, ownership, and management of its own railways. As a result, less than 500 miles of line remain in private hands. The construction and equipment of the railways has cost the States over $600,000,000, which amount constitutes 62 per cent. of the total public debt. After the interest on this debt and the running expenses have been paid there is almost invariably, in all the States, a deficiency to be met by taxation. Western Australia and South Australia (excepting the Northern Territory) were exceptions to this rule in 1900, while in New South Wales the net loss was but 0.14 per cent., and the largest net loss, that in Tasmania, has not exceeded 2.68 per cent.

In all the States the results are becoming more satisfactory. Victoria, in 1883, and subsequently South Australia, New South Wales, and Queensland took the control of the railways out of the hands of the minister of railways or public works, and vested it in special commissions or commissioners. The Government administration of railways has not been entirely free from grave faults and wasteful undertakings, yet it has advanced the settlement of the country in a way that could never have been expected of private enterprise. Thus, not only have cheap passenger and freight rates been secured, but new industries have been fostered by special freight rates, and various emergencies have been met, such as the transportation of sheep to watering places in times of drought, or laborers to different parts of the country, as their interests demanded, etc. The employees are enjoying an eight-hour law and are receiving comparatively high wages.

The following table shows the course of railway development in Australia and the separate States:

Number of Miles of Railway

State	1861	1871	1881	1891	1900	Population, 1900, per mile of line open	Area, 1900, per mile of line open, square miles
N. S. Wales	73	358	1,040	2,266	2,896	468	107
Victoria	114	276	1,247	2,903	3,218	361	27
Queensland	......	218	800	2,320	2,801	172	238
S. Australia	66	133	845	1,823	1,901	194	475
W. Anstralia	......	......	92	657	1,632	105	698
Tasmania	......	45	168	425	547	333	48
Com'nwealth	243	1,030	4,192	10,394	12,995	287	228

The capitals of the four eastern States are connected by railway lines. The plan is being considered of connecting the South Australia system with that of Western Australia, making a trans-continental east and west line; while another plan purposes to establish a north and south trans-continental line connecting the short line in Northern South Australia with the system in the south.

Telegraphs and Telephones. The telegraph and a major portion of the telephone system are in the hands of the Government, and progress in their development has been very rapid. In 1871 there were 11,500 miles of telegraph line; in 1899, 44,200 miles. There are now north and south, and east and west lines across the continent. The messages average over 2 per capita of the population annually, or twice that for the United States. A cable connects Port Darwin with Java, and through that with the European cables; and another connection is made through a wire extending from Broome, Western Australia, to Banjuwangis. Other lines connect Broome with Adelaide, Victoria with Tasmania, New South Wales with New Zealand, and Queensland with Bundaberg.

Commerce. In a country which produces raw material so largely, and manufactured products so little, the trade with other nations is naturally enormous. Australia exceeds all countries in her per capita production, and all except Belgium in the per capita value of her trade. With a smaller population than Canada, both her imports and exports are nearly double those of the latter. The following table shows the increase in the tonnage entering and clearing the Australian ports:

Total Tonnage Entered and Cleared

State	1861	1881	1899
New South Wales	745,696	2,786,500	6,995,551
Victoria	1,090,002	2,412,534	5,341,455
Queensland	44,645	882,491	1,464,063
South Australia	199,331	1,359,591	3,619,251
Western Australia	115,256	285,046	2,638,648
Tasmania	230,218	383,762	1,318,117
Commonwealth	2,425,148	8,109,924	21,377,085

Of the tonnage, the interstate shipping constitutes about 22 per cent. British vessels constitute 85 per cent. (19,500) in the entries and clearances of all the foreign vessels doing business with Australia. This is a smaller proportion than in former years, whereas the entries and clearances of vessels from the Continental countries of Europe, as also the trade with the Continental countries (particularly France and Germany), is relatively increasing. The tables below indicate the development of the total foreign trade, and of that with the principal foreign countries. (The total includes, also, New Zealand, which amounts to a little over one-fifth of the whole.)

Imports direct from	1881	1891	1899
United Kingdom	$128,310,000	$154,115,000	$133,790,000
France and New Caledonia	1,700,000	1,845,000	2,835,000
Germany	1,125,000	8,865,000	11,220,000
United States	2,965,000	14,650,000	26,195,000
Total Imports	$166,715,000	$207,040,000	$200,115,000

Besides the increasing relative importance of non-British trade, the most remarkable fact is the growing importance of the exports as compared with the imports. Wool, gold, and metals constitute the bulk of the leading exports, and manufactured articles that of the imports.

Exports	1881	1891	1899
United Kingdom	$121,710,000	$163,190,000	$179,960,000
France and New Caledonia	1,680,000	9,175,000	19,465,000
Germany	350,000	4,315,000	14,505,000
United States	6,490,000	16,345,000	16,485,000
Belgium	500,000	7,425,000	11,235,000
Total Exports	$156,050,000	$216,215,000	$288,365,000

Banks. In Australasia there are twenty-two banks, most of them having numerous branches in Australia. The banks are organized on a broad basis of ample capital and surplus, and until the crash of 1893 they enjoyed almost uninterrupted prosperity. In that year fourteen of the twenty-six banks then in operation failed. The misfortune was inevitable, in the general condition of affairs. The extensive borrowing of the Government and the construction of public works had led to speculation and a general inflation of prices. When further loans by the Government became impracticable and work stopped, the masses were without employment, money grew 'tight,' and runs on the banks followed. The banks were quickly reorganized, however. The paid-up capital of banking companies now operating in Australasia increased from about $73,000,000 before the crisis to more than $105,000,000 in 1900. The total liabilities of the banks of the Commonwealth in 1900 exceeded $472,000,000; the assets $578,000,000. The deposits aggregated $450,000,000; the coin reserve amounted to $105,000,000; and the bullion, $6,000,000. The savings banks are to a certain extent under State control, and enjoy the public confidence. The post-office savings banks are operated in conjunction with the post-office. The number of depositors in the Commonwealth savings banks increased from 110,000 in 1871 to 909,000 in 1900, and the deposits in proportion. The combined deposits of banks of issue and savings banks in 1900 exceeded $593,000,000. Gold is the standard of currency, and the coins circulating are of the same denomination as those of Great Britain.

Government. The Commonwealth of Australia is a Federal State under the supreme authority of the Crown of Great Britain, and was so constituted on January 1, 1901, by the union of the British colonies of New South Wales, Victoria, Queensland, South Australia, Western Australia, and Tasmania. The provisions of the Federal constitution will be found treated in detail under Australian Federation.

Defense. The Australian States have always been opposed to the maintenance of a standing army; yet a fairly complete system of fortification has been constructed, to man which has required a standing army of less than 2000 men. The volunteer service on partial pay has been the most popular system. (See Volunteer, Military.) For the purposes of coast defense, there are a British fleet consisting of four cruisers and a small number of gunboats and sloops, and an auxiliary fleet of five cruisers and two torpedo boats. The interest on the cost of maintaining the auxiliary fleet is paid by the Commonwealth, which, under the new Constitution, has exclusive control of the systems of defense.

Finance. The different State governments of Australia have ventured farther into the industrial field than any of the older governments of the world, in consequence of which their annual revenues and expenditures attain a disproportionately large figure. For a number of years the per capita expenditure has exceeded $35. Some of these Government enterprises, notably the railroads, have not yet on the whole proved self-supporting, and in proportion to their deficit the burden of taxation has been increased. The expenditure incurred in the ordinary administration of government is the largest single item, constituting about one-third of all. Next to this is the interest on the public debt, about one-fourth of the total. In 1900 the revenue raised by taxation amounted to over $50,000,000, or about $13 per inhabitant. A little less than one-third of this was collected by direct taxation, which included stamp duties (probate, etc.), land tax, and income or dividend taxes. The indirect taxes were import and excise duties. Prior to the establishment of the Commonwealth, the different States levied import duties on interstate as well as foreign imports. New South Wales alone was inclined to a free-trade policy. The formation of the union brought about the abolition of interstate tariffs and has made it all the more necessary to raise a part of the revenue by duties on foreign imports—a policy for which there seems to be no alternative, however distasteful to the mother colony (New South Wales).

The public debt of Australia continues to increase, and considering that she has been in no wars, it reaches a remarkable if not an alarming amount. Prior to 1871 the States were indebted to British capitalists to the extent of £26,500,000 ($130,000,000). By 1899 the debt was increased by £152,900,000 ($764,500,000). This was equivalent to about $240 per inhabitant, or nearly three-fourths of the net debt of the United States. The foreign indebtedness of the Commonwealth appears still relatively greater when the fact is considered that British capital has been put in private undertakings within the States to the extent of £85,000,000 (about $425,000,000). It is estimated that the foreign capital invested in the country is more than 14 per cent. of the total wealth. This, however, occasions little alarm among the people of the country, who point to their rapidly increasing trade, the certainty of internal development, the high rate of wages, the large proportion of property holders in the population, and the great material benefits secured to the mass of the people by the permanent improvements effected by the Government with the aid of borrowed capital.

Population. The population of Australia represents the development of the first century of her history, and compares favorably with the corresponding period in other new countries, e.g. the United States or Argentina. In 1801 the white inhabitants were but 6,500, which number increased during the first half century to about 400,000, the majority of whom were located within the present limits of New South Wales. The growth from 1861 to 1901 is indicated in the following table:

State	1861	1871	1881	1891	1901
New South Wales	350,860	503,981	751,468	1,132,234	1,362,232
Victoria	540,322	731,528	862,346	1,140,405	1,199,692
Queensland	30,059	120,104	213,525	393,718	502,892
South Australia	126,830	185,626	279,865	320,431	354,001
Western Australia	15,691	25,353	29,708	49,782	182,553
Tasmania	90,211	101,785	115,705	146,667	172,000
Commonwealth	1,153,973	1,668,377	2,252,617	3,183,237	3,773,370

The population of Australia has shown a rather premature and excessive tendency to settle in the large cities. This has not been for the best interests of the States, since the industrial system does not call for such a fact. This centralization has not been at the expense of the rural districts, however. It is rather due to the character of the immigrant population. The following table shows the increase in the principal city of each State; the impulse toward centralization seems to have spent itself:

City	1871	1891	1901
Sydney	137,776	383,283	488,968
Melbourne	206,780	490,896	494,100
Brisbane	15,029	93,657	....
Adelaide	42,744	133,252	162,261
Perth	5,244	8,447	....
Hobart	19,092	33,450	41,412

But three other places have a population exceeding 40,000, viz.: Newcastle, in New South Wales, 55,000; Ballarat and Bendigo, in Victoria, with 46,000 and 43,000 respectively.

Immigration. The discovery of gold has done more than any other factor to attract immigration from abroad and from one State to another. An illustration of this is the remarkable development of Victoria in the decade following 1850, and of Western Australia from 1891 to 1901. During the early part of the Nineteenth Century the convicts brought from Great Britain constituted a considerable part of the population. The assistance rendered to immigrants by the State Governments has been of importance, the States having borne the expenses in whole or in part of over 600,000 immigrants. The conditions for acquiring land have been most favorable (see the paragraph on *Agriculture* in this article). Foreign immigration greatly decreased, however, during the last decade of the century. Queensland contains the largest percentage of foreign born, who constitute a third of the total population of the Commonwealth. The large majority of the foreign born come from the United Kingdom. Less than 4 per cent. of the population were born in lands not belonging to Great Britain. Of these, the Germans and Chinese are the most numerous, each exceeding 40,000. There are in the Commonwealth only about 9,000 persons born in the United States. The Chinese are decreasing in numbers, the State laws now almost prohibiting their immigration; there are heavy fees exacted from landing immigrants, and ships are limited in the number they may bring—the number varying with the amount of the cargo. It has been found that the whites cannot so well endure the heat of Queensland in the cultivation of sugar cane as can the blacks, and this has led to the importation of Kanakas from the South Sea Islands.

Religion. In the first days of Australian settlement the Church of England was the only church recognized and aided by the Government. Later, State aid was extended to the Catholics, Presbyterians, and Wesleyans, and offered to certain other denominations, who refused to accept it. The opposition to State assistance finally became general, and such aid has been discontinued, Western Australia being the last State to abandon the old system (1895). The Episcopal Church, which greatly outranks the others in all the States, has six dioceses in New South Wales, two each in Queensland and Victoria, and one each in South Australia, Tasmania, and Western Australia. While Episcopalian autonomy is preserved in each State, the States have a common constitution, and every five years their representatives meet in a general synod. The following table shows the relative strength of the different denominations in the States on the basis of the census of 1891. Aside from the growth of the Salvation Army, the relative importance of the different denominations has remained about the same. The percentages in the table represent proportions to the total population.

State	Episcopalians	Roman Catholics	Presbyterians	Wesleyans and other Methodists	Congregationalists	Baptists	All others
New South Wales	44.8	25.5	9.7	9.8	2.1	1.2	6.9
Victoria	35.2	21.8	14.7	13.0	1.9	2.5	10.9
Queensland	36.2	23.6	11.6	7.8	2.2	2.6	16.0
South Australia	27.9	14.7	5.7	19.0	3.7	5.5	23.5
Western Australia	49.7	25.3	4.0	9.2	3.2	0.6	8.0
Tasmania	49.9	17.6	6.6	11.7	3.1	2.2	8.9

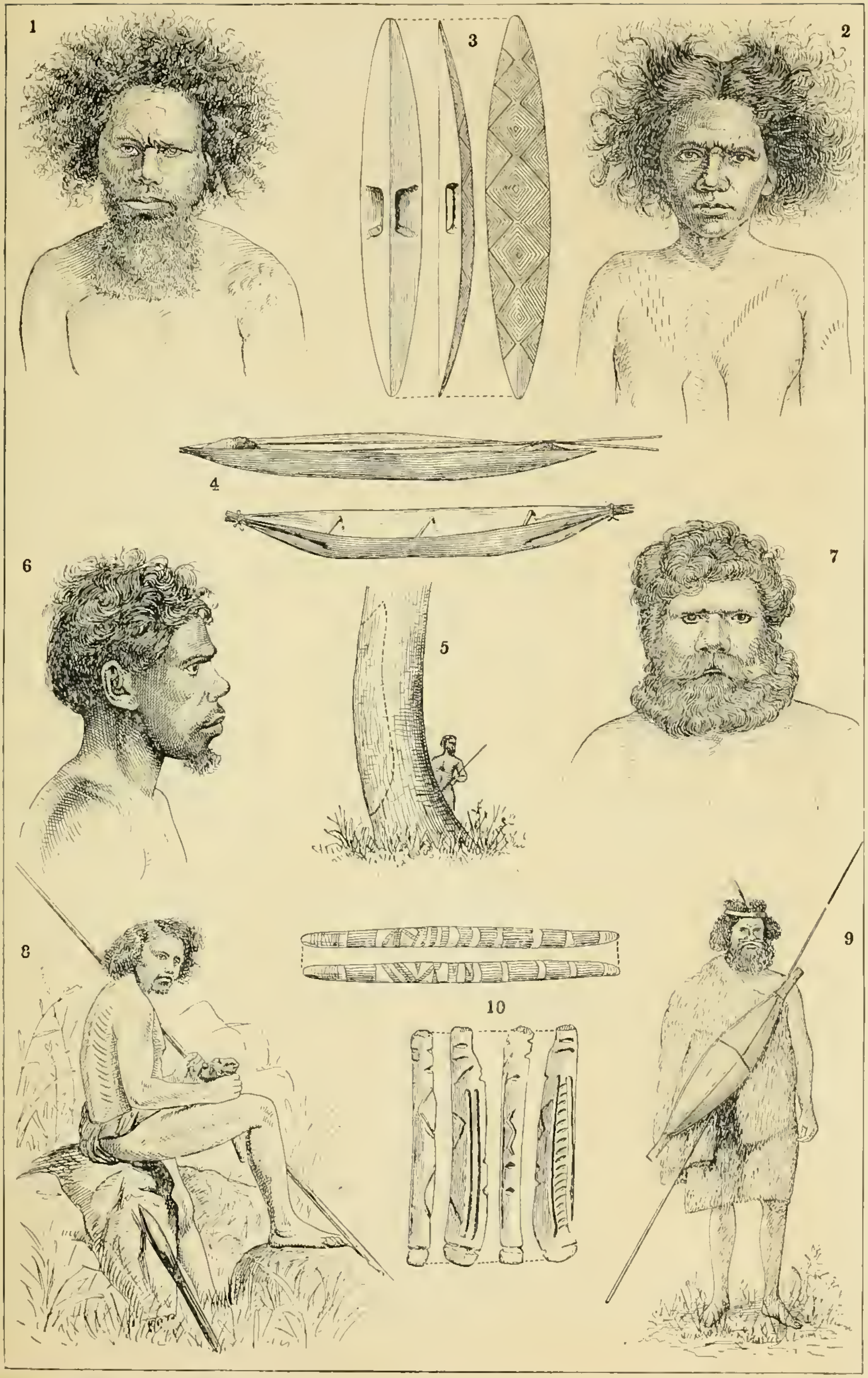
Education. In the early days of the States, education was provided for by State-aided religions, by organizations of various denominations, and by tuition fees exacted from the pupils. In time education was made secular and free. In New South Wales and Tasmania nominal fees are still charged, yet not required in cases of inability to pay. Religious instruction is also still provided for, but only outside of regular school hours. It is given by a clergyman instead of by regular teachers, and is subject to the desire of the parents. Education is compulsory in all of the States; yet strict enforcement of the compulsory feature is only attempted in Victoria, and in a few of the larger towns elsewhere. On the contrary, non-attendance or irregularity of attendance is grievously common in most localities. A high rate of illiteracy is the result. Statistics show, however, a decided recent improvement. In 1861, 1619 people out of every 10,000 of the population (including New Zealand) over five years of age could not read. In 1891 the number fell to 803 in every 10,000. This illiteracy is partly due to the adverse conditions always met with in the early days of a new country. In 1899 there were 634,000 children enrolled in the State schools compared with 149,000 in the private schools. Secondary education is generally in the hands of private or denominational interests. There are State high schools in New South Wales (fees being charged), while in Victoria teachers of the ordinary grades are allowed fees for teaching extra subjects. Technical instruction is given at the capital cities, and is extending to other points, a decided interest being manifested in it. Universities, partly supported by the State, are located at Sydney, Melbourne, Adelaide, and Tasmania.

State Activity and Social Conditions. Especial interest attaches to Australia because of the wide scope of its State activities. In this respect Australia excels the older countries of the world, a number of its governmental ventures not having been elsewhere attempted, being generally held to be without the proper province of the State. It is, therefore, being closely watched, and the results attained are destined to have a far-reaching influence. The most important of these activities have been mentioned under the different headings, and they comprehend the construction, ownership, and control of railways and tramways; the construction and maintenance of highways; the surveying of all country roads (and, in Victoria, the maintenance of the same); the ownership and control of telegraph and telephone lines as a part of the postal system; Government savings banks; irrigation, including the boring of numerous artesian wells; supplying watering-places for cattle, and water to mines; assisting agriculture by granting reduced freight rates on Government railways in the transportation of seeds and implements, or of cattle in time of drought; appropriating large sums for the furthering of agriculture in various other ways, such as the extermination of injurious animals and insects. (For the extermination of rabbits alone, which at one time became a veritable scourge to the country, the State governments have expended more than $10,000,000.)

The States have also advanced loans to farmers, and granted bounties to producers of butter and cheese, and to fruit growers, etc. The paying of bounties is not limited to agriculture. They are liberally resorted to in all cases where it is believed that a new industry or a useful departure may be thus established. South Australia manufactures wine, and also runs a cyanide plant. New South Wales, finding her wine industry greatly injured by lack of proper cold storage facilities, erected a Government storehouse. Tasmania exports timber blocks. The policy of substituting the leasehold for the freehold system of land tenure is being adopted. Old-age pension systems are in force in Victoria and New South Wales. The municipal activities have been very limited compared with those of the States.

The social order which prevails in Australia much resembles that of the United States. No titled aristocracy or hereditary class distinctions

AUSTRALIAN ABORIGINES



1. MAN OF NEW SOUTH WALES.
2. WOMAN OF NEW SOUTH WALES, showing scar-tattooing.
3. A SHIELD, front, back and side views.
4. BARK CANOES.
5. TREE, showing outline of canoe on bark, before cutting.
6. MAN OF QUEENSLAND.
7. MAN OF SOUTH AUSTRALIA.
8. MAN OF NORTH AUSTRALIA, with spear, axe and club.
9. NATIVE OF VICTORIA IN ORDINARY ATTIRE.
10. MESSAGE STICKS.

are recognized, and perhaps in no place is the feeling of democratic equality and the spirit of hopefulness more widespread. The double advantage is enjoyed of high wages and low or moderate prices for necessaries. Many articles, considered as luxuries in Europe, are of common consumption in Australia. The abundance of the meat products (beef and mutton) makes them the staple food. The annual per capita consumption of meat is 264 pounds, as against 150 for the United States and 109 for Great Britain—two countries that are in the front rank of meat-consuming nations. The per capita expenditure is $180, against $160 for the United States. Sixteen out of every 100 people own property, as against only 10 in Great Britain. There are no 'poor rates,' but the Government often finds employment for the able-bodied. Numerous hospitals are maintained by the Government. State aid is given to private philanthropic institutions, and there are a number of charities wholly supported by private philanthropy.

THE ABORIGINES. The Australian aborigines, whom some ethnologists would rank as a separate race of mankind, are over, rather than below, the average stature, less strongly and massively built than the European generally, long headed, with depressed nose and wide nostrils, large mouth, thick lips, etc.; features suggesting now the Negroid, now the Caucasian type. The color of the skin is dark, running all the way from a yellowish to a pronounced black. The hair, with which the Australians are well provided on body and face, is black and straight or wavy generally, sometimes curly, but never woolly. Beneath an apparent physical unity all over the island lurks considerable variation, which, like the ensemble of the Australians, may in part be due, as Ratzel holds, to poor nutrition (the common condition of man in this habitat), and in part to prehistoric and historic race-intermixture with primitive south Asiatics, Malays, Papuans, etc. Caldwell (1856) and Bleek (1872) sought on linguistic grounds (deemed insufficient by Baron F. Müller), to connect the Australian and the Dravidian stocks; while Hale (1891) considers the Australians 'degenerate Dravidians'; and Brinton (1890) groups Australians and Dravidians as one Australic stock. J. Mathew (1899) believes the Australians to be a composite people of Papuans, Dravidians, and Malays in the order given, the Tasmanians representing best the Papuan substratum. Huxley (1870) believed that one of the earliest races of prehistoric Europe was Australoid in type, and other ethnologists down to Keane (1896), Giuffrida-Ruggeri, and Schoetensack (1901) consider the Australians on somatic evidence related to the men of Spy and Neanderthal, in Quaternary Europe.

In an interesting article in the *Zeitschrift für Ethnologie* for 1901 Schoetensack argues that Australia was really the area where the precursor of man first developed the essentially human traits, .spreading thence Asiawards over the globe. Linguistically the Australians present great internal variation, with a general unity remarkable in so extensive a habitat. Sociologically, the most noteworthy things are the complicated marriage systems, the numerous and elaborate initiation ceremonies for youth, the corroboree-dance, and the totem system, the recent study of which has shed much light upon primitive religion. Australian mythology, as the two volumes of *Legendary Tales* (1896-99) by Mrs. Parker prove, is more extensive than formerly supposed, but is now somewhat influenced from white quarters. In the way of inventions, their methods of tree-climbing, the boomerang and the throwing-stick, the waddy (club), their message-sticks (with the beginnings of writing), and shamans' staffs, are to be mentioned. Their ground and tree drawings, rock-pictures, etc., are of great interest. Pottery is unknown, and few of the rudiments of agriculture are present. The case against the Australians as a degenerate race is not made out. By the census of 1891 the Australian aborigines numbered somewhat less than 60,000, a fact which indicates that they are not disappearing so fast as is commonly believed. See TASMANIA.

HISTORY. The fact that the earliest manuscript maps known which give any realistic representation of Australia are the work of French cartographers would suggest that French navigators were the first to visit those coasts. In 1521 there were indications of a southern continent on maps drawn by La Salle and the German Schöner. Ten years later the land mass begins to take more definite shape on the map of Orontius Finæus, of Provence, and by 1542, on the maps of Jean Rotz, the outline begins to conform distinctly to what we now know as Australia. There are, however, no other surviving records of voyages to that region, and it is practically certain that the Sieur de Gonneville and Capt. Jean Parmentier, the only Frenchmen who are known to have sailed the Eastern seas thus early (1529), did not go beyond Sumatra. It is probable that the maps were drawn from information obtained from Portuguese sources, although the earliest extant account of a voyage which may have reached to Australia, that of the pilot Gaetan, was made in 1545.

The first authenticated voyage to Australia was made by the Dutch in 1606, although there are good reasons for thinking that five years earlier (1601), Manoel Godinho de Eredia, a learned and skillful Portuguese navigator, who had been commissioned by the Viceroy Ayres de Saldanha to verify reports derived from the Malayans of a large land toward the south, saw the continent. There is, however, no uncertainty about the voyage of the Dutch yacht, the *Duyfken* or *Dove*, which sailed from Bantam, in Java, November 18, 1605, and coasted southward from New Guinea along the islands on the west of Torres Strait to a point somewhat west and south of Cape York. As he was back at Banda, in the Moluccas, in June, 1606, the commander of the *Duyfken* is supposed to have made the first recorded observation of the Australian coast about March of that year. Later in this same year, Luys Vaez de Torres, who commanded one of the ships in a Spanish squadron which had been ordered to make exploration in the Eastern seas, became separated from the other vessels and continued his voyage eastward, touching the eastern end of New Guinea, and then passing through the strait to which his name has been given. He touched the northern coast of Australia at several points, but finding only an unsafe shore and savage natives, he did not follow it far. During the next thirty years the Dutch pursued the exploration of the western coast of

Australia with as much industry as the Portuguese had displayed in exploring that of Africa a century and a half earlier. In 1616 Dirk Hartog, in the *Endraaght*, discovered the land which is named after his ship, and the cape and roadstead to which his own name has been given. Jan Edels left his name on the western coast in 1619, and in 1622 the ship *Leeuwin* or *Lioness* reached the most western point of the continent, to which its name is still attached. Five years later Peter de Nuyts sailed around the south coast, and the same year Carpenter, in the Dutch service, entered the Gulf of Carpentaria. Abel Jansen Tasman was sent out from Batavia in 1642 to investigate the real extent of the Southern Land. Going wide of Cape Leeuwin, he hit upon the land to which he gave the name of the governor-general at Batavia, or of his daughter Marie, with whom Tasman is reported to have been in love, Van Diemen's Land, which is now more generally known as Tasmania. Tasman kept on, and by sailing east proved that there was no connection between this land, which he supposed joined with the Australian continent, and the greater continent about the southern pole, whose extent had been vastly exaggerated by all the earlier geographers from the days of Ptolemy. He touched New Zealand and then returned to Batavia, having settled many of the geographical problems regarding this part of the world. Two years later Tasman probably continued his explorations in the neighborhood of the Gulf of Carpentaria, and it was at this time that the name New Holland was given to the continent. This name continued to be the one most commonly used until the middle of the Nineteenth Century, when the name Australia, probably first suggested by Matthew Flinders in his *Voyage to Terra Australis,* began to supplant it. Neither the land nor the natives, which had been seen by these several voyagers, offered anything to induce further exploration on behalf of commercial or political interests.

For a century and a quarter the Southern Land was left largely to itself, until a purely scientific expedition was dispatched thither. Capt. James Cook, commanding the *Endeavour*, was sent to Tahiti to observe the transit of Venus on June 3, 1769. This successfully accomplished, he continued to New Zealand, passing through the strait which bears his name. On April 20, 1770, he reached a land hitherto unknown to the map makers, and the naturalist of his party, Joseph Banks, found in the neighborhood of their anchorage so many specimens of plants entirely new to science that they named the place Botany Bay. Cook coasted north, almost losing his ship on the Great Barrier Reef, but by keeping inside along the coast, until he had passed Endeavor Strait, he proved that this land was distinct from New Guinea. He gave the name of New South Wales to the land he had coasted, from some resemblance that he saw to the shores about the English Swansea. Returning to England, Cook was sent out again in 1772 to continue his explorations. From the Cape of Good Hope he zigzagged across toward Australia, and thence to Cape Horn, to see if any landmarks remained undiscovered in those seas. Cook's reports led to talk of settling the southern continent and claiming it for England. In 1788 Captain Philips landed some convicts at Botany Bay, where Sydney now is, and from this time on the English have steadily stretched out along the coasts and inland. In 1797 a naval surgeon named Bass started south with six men in a whaleboat from Port Jackson and proved the existence of open water, now called by his name, between the continent and Tasmania. One of Bass's companions, two years later, sailed eastward from Cape Leeuwin along the southern coast. At Encounter Bay he met a French ship, and named the spot in consequence of the incident. He proceeded as far as Port Philip. The Australian coast-line was all practically determined when, in 1822, Capt. P. P. King completed his five-year voyages of investigation of the river mouths of the continent.

The successful exploration of the interior began with Philip Wentworth's journey across the Blue Mountains of the east coast in 1813, to the fertile plateau beyond. The next year Evans discovered the Lachlan and Macquarie rivers, and penetrated the Bathurst plains. Captain Sturt, in 1818-29, succeeded in dispelling the notion which had gained currency of a great inland sea, but in its place he substituted the more discouraging one of a vast lifeless desert. This seemed to be confirmed when, in 1847, the German, Leichhardt, who had previously crossed overland from New South Wales to Port Essington, in North Australia, started to traverse the continent from Queensland to Western Australia, and was never heard of again. In 1860 Burke and Wills, with an outfit furnished by the colony of Victoria, successfully crossed the eastern portion of the island from north to south, and between 1858 and 1862 John M'Douall Stuart performed the much more difficult feat of crossing from south to north, near the middle, in order to trace a course for the telegraph line which was erected shortly afterwards. Scattered settlers and ranchers had by this time opened up practically all of the eastern regions, but the western deserts remained a blank on the map. Between 1868 and 1874 John Forrest penetrated from Western Australia as far as the central telegraph line, and Ernest Giles did the same from the north between 1872 and 1876. These two routes were joined in 1897, when the Hon. Daniel Carnegie successfully accomplished the journey by the direct route from the Coolgardie gold-fields in the south to those of Kimberley in the north. Other expeditions under Gosse and Warburton in 1873 and H. V. Barclay in 1878 added materially to the knowledge of the country west of the central telegraph line. More recently the discovery of gold has resulted in numerous prospecting parties going into nearly every section of the uncultivated interior, with corresponding advantage to geographic information.

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AUSTRA'LIAN ASH. See FLINDERSIA.

AUSTRALIAN BAL'LOT. See BALLOT.

AUSTRALIAN BEECH. See GMELINA.

AUSTRALIAN FED'ERA'TION. On January 1, 1901, the five Australian colonies of Great Britain, together with Tasmania, united to form a Federal State under the name of the Commonwealth of Australia. The movement toward federation had its beginnings probably as early as 1850, though the first step toward consolidation was not made till 1885. The union of the Australian colonies was favored by the fact that in the main they possessed a homogeneous population, with the English-speaking race predominant, and almost identical political institutions. Economic differences there prevailed to a certain extent, as, for instance, between New South Wales, which possessed a large urban population and a highly developed industrial system, and South or Western Australia, occupied almost exclusively by a mining population. Nevertheless this difference in wealth between different sections of the continent could not, and in the end did not, prove an insuperable obstacle toward the attainment of an object which so many other causes united to favor. The first important advance toward federation was made in 1885, when the Federal Council of Australasia was created by act of the Imperial Parliament. This body, which was composed of two delegates from each of the five Australian colonies, and from New Zealand, Tasmania, and Fiji, was endowed with certain limited powers in minor legislation and the administration of justice; but in its very nature it was merely an advisory body, possessed of little authority to impose its will upon the different colonies, and although it continued in existence until the institution of the new Commonwealth, in 1901, its usefulness had ceased long before that time. In 1891 a National Convention, assembled at Sydney, declared in favor of Australian union and laid down the principles upon which the new Commonwealth should be based, the fundamental idea being that of a Federal Government with ample powers over foreign affairs, customs, and public defense, but circumscribed in its scope by the provision that all powers not expressly granted to the Central Government remained vested in the States. No definite result, however, followed the action of the Convention until 1895, when a conference of colonial premiers, meeting at Hobart, succeeded in drafting an Enabling Act providing for the election of delegates to a Constitutional Convention, and the act was submitted to the legislatures of the various colonies.

On March 22, 1897, the Constitutional Convention met at Adelaide, whence it adjourned to Sydney and finally to Melbourne, completing its work on March 17, 1898. The constitution as drafted was submitted to the people of the colonies, and was adopted by a majority vote of five to one in Victoria, of two to one in South Australia, and of five to one in Tasmania. In New South Wales, 71,412 votes were cast in its favor, and 65,954 votes against it; but as the legislature had stipulated that a minimum of 80,000 votes or about one-third of the total electorate should be necessary for ratification, the constitution was declared rejected. Queensland and Western Australia took no action in the matter. After certain changes demanded by New South Wales had been effected in the constitutional draft, the instrument was once more submitted to the people in 1899, and though opposition was still strong, the Federalists won by a decided majority in New South Wales, and by increased majorities in the other colonies that had previously taken action. Queensland ratified the constitution before the end of the year. Early in 1900 the constitution was submitted to the Imperial Parliament at Westminster, and was adopted with but a single modification, to be noted hereafter. By the statute of 63 & 64 Vict. chap. 12, the five colonies which had ratified the constitution were merged into the new Commonwealth of Australia, with the provision that Western Australia should be admitted to the Commonwealth on ratifying the constitution, which action it took July 31, 1900. On January 1, 1901, the new nation was proclaimed in the capitals of the former colonies, now known as original States.

The constitution of Australia is modeled obviously upon that of the United States, in that it is based upon the principle formally stated, that all powers not delegated to the Central Government were reserved to the States. During the process of constitution-making, this principle encountered great opposition from those who favored a strongly centralized State, modeled upon the constitution of Canada. The legislative power of the Commonwealth is vested in a Federal Parliament composed of the Sovereign of Great Britain or his representative, a Senate, and a House of Representatives. The Governor-General may summon, prorogue, and dissolve Parliament, which must meet, however, every year. The Senate is composed of six members from each of the States, elected at large for a term of six years. The members of the House of Representatives are chosen for three years, and must comprise, as nearly as possible, twice the number of senators, but no State may have less than five members in the lower house. For the first Parliament, New South Wales was apportioned 26 seats; Victoria, 23; Queensland, 9; South Australia, 7; Western Australia, 5; and Tasmania, 5. Parliament has the power of increasing the membership of either house, but no State may be deprived of its absolute or proportionate representation without its consent. The qualifications for an elector to either house of Parliament are the same as those for an elector to the lower house in the different States. In defining the scope of the Federal Parliament the framers of the constitution did not show themselves so ardently in favor of State rights as to grudge it the exercise of wide powers. Profiting, on the contrary, by the experience of the United States in the matter of the conflict of State laws, and influenced, too, by the opposition of those who advocated a strongly centralized government, they included within the jurisdiction of Parliament such subjects as divorce, bankruptcy, and corporations, and prepared the way for the absorption of the colonial railways by the Federal Government. Closely summarized, the exclusive powers of Parliament are as follows: (1) Taxation, both direct and indirect, borrowing money on the public credit, currency, coinage, and legal tender; (2) defense; (3) the regulation of foreign and interstate commerce, including navigation, shipping, and interstate railroads, and the granting of uniform bounties on the production and exportation of goods (but each State may grant bounties for the encouragement of the mining industry); (4) banking and insurance carried on in more than one State; (5) bankruptcy, copyright, patents, trade-marks, and corporations; (6) marriage, divorce, parental rights and guardianship; (7) census and statistics, weights and measures; (8) external affairs, immigration and emigration, quarantine, the influx of criminals, naturalization, and the control of any race, other than the aborigines, requiring special legislation (this referring to the important question of Chinese and Japanese coolie labor); (9) posts, telegraphs, and telephones; (10) astronomical and meteorological observations, coast service, and fisheries; (11) industrial arbitration in questions involving more than one State, invalid and old-age pensions; (12) the service of criminal and civil process, and the establishment of judicial comity among the States; (13) the control of the railways for the purposes of national defense, the permanent acquisition of the railways with the consent of the States involved, and the construction of new railways; (14) finally, all legislation incidental to the execution of powers specifically delegated. Any State law that is in conflict with a law passed by Parliament, acting within its jurisdiction, is void.

Legislation may be initiated in either house, but money bills must originate in the House of Representatives. The Senate has no power to amend an appropriation bill, but may reject such measure. In case of a deadlock between the two houses lasting more than three months, as when the Senate persists in rejecting a bill repeatedly passed in the lower house, or in adding amendments which that house refuses to accept, recourse is had to a dissolution and to a general election, and if the deadlock continues in the new Parliament the two houses meet in joint session and decide the matter by a majority vote. The executive power is vested in a Governor-General, nominated by the Crown, and in a council of not more than seven salaried ministers, appointed by the Governor-General and responsible to Parliament, of which they must be members. The judicial power is vested in a Federal Supreme Court known as the High Court of Australia, exercising original jurisdiction in cases involving treaties with other nations or the representatives of foreign nations, or cases to which the Commonwealth is a party, or a State, or the residents of different States. It hears appeals from the minor Federal courts and from the Supreme courts of the States. No appeal may be taken from the decision of the High Court to the British Privy Council on questions involving the limits of the constitutional powers of the Commonwealth or of the different States, unless the High Court certifies that the question is one which ought to be determined by the Sovereign in Council. In all other cases, appeals lie to the Privy Council, subject to the rules of procedure established by the Australian Parliament.

The rights of the States are affirmed in the clause reserving to them all powers not delegated to the Federal Government. Their present constitutions continue in force, their laws are judicially recognized, and their territorial integrity and political influence are guaranteed by the provision that no amendment altering the boundaries of a State or reducing its absolute or proportional representation in Parliament is valid without the consent of the State; whereas, an ordinary amendment to the constitution may be passed by a majority of both houses of Parliament, and ratified by the people of a majority of States, constituting at the same time a majority of the whole body of electors in the nation. New States may be carved out of one or more of the original States with their consent, and Parliament may prescribe conditions for the admission of new States into the union.

The Australian Constitution, like the Constitution of the United States, upon which it is modeled, is the result of compromise between the principles of loose federalism and centralization. The former was undoubtedly favored by the great majority of people, but met with strong opposition from the powerful labor element, which was especially influential in New South Wales and Victoria, and succeeded in defeating the constitution at the first referendum. This party, which may be considered the democratic or even the radical party in Australian politics, assailed those provisions especially which made the passing of a constitutional amendment for changing the boundaries of a State so difficult. They also pointed out the anomaly presented by a responsible ministry in a Federal Government where either house may claim an equal right to control the cabinet, and they insisted that in the course of time the ministers would be made answerable, not to the popular House, in spite of its control of the purse, but to the Senate, which is the stronghold of particularism, and which, by reason of its longer duration and the fact that it is renewed by rotation and not in mass, could pursue a more consistent and more aggressive policy than the House of Representatives. The example of the United States Senate was cited to prove that an upper house possessing no powers of originating bills of revenue may yet become the leading factor in shaping legislation. But perhaps the most disputed clauses of the constitution were those providing that three-quarters of the national revenue should be redistributed among the States in proportion to their original contributions. The reason for this provision was the fact that the transfer to the Federal Government of the custom and excise duties, which were the principal sources of revenue in all the colonies except New South Wales, would have bankrupted some of the States and seriously crippled all. Moreover, the logical result of the provision would be the imposition of a high tariff on imports, since the General Government was limited to the use of one-fourth only of the total income. To the people of New South Wales, which has consistently been a free-trading colony, the prospect of a high protective system was disagreeable. The question lost nothing in importance after the inauguration of the new government; the elections for the first Parliament were fought out on the tariff issue, and the result of the elections showed an almost perfect balance between the advocates of low tariff and protection.

The Commonwealth has been regarded by many students of politics as a step toward complete Australian independence. The veto power lodged in the Crown and the right to appoint the Governor-General of the Commonwealth are of only little importance as binding ties between the mother country and Australia, in view of the British theory of the relations of the executive toward the legislature. Practically the only bond between Australia and the Empire is the right of appeal from the courts of the Commonwealth to the Sovereign Council. In the constitutional draft submitted to the British colonial Secretary, it was provided that no appeal should lie to the Privy Council except in cases involving the interests of some other part of the Empire. The British Colonial Office insisted upon the modification of this clause, and in the final act it was given the form already described. It is generally conceded, however, that in practice the tendency would be to restrict the exercise of the right to appeal to the utmost.

AUSTRALIAN GUM-TREES. See EUCALYPTUS.

AUSTRALIAN LIT'ERATURE. Australia was not claimed for Great Britain until 1770, and the first settlements were penal. Then followed the sheep-farmers, and, on the discovery of gold in 1851, a horde of adventurers. By 1859, Australasia (Australia, Tasmania, and New Zealand) consisted of seven independent colonies. The period of national unity did not begin till 1901, when these States, except New Zealand, were federated under the name of the Commonwealth of Australia. Young Australia has not had time to develop a literature of her own. She is where the United States was a century ago—in the imitative period. Her first writers, who came midway in the Nineteenth Century, were Englishmen or Scotchmen bred at the public schools and at the universities, some of whom returned to the land of their birth; while several contemporary writers, though in some instances born in Australia, have settled in London. Hence by Australian literature we can mean no more than English literature inspired by the life and scenes in this island of the South Seas.

The early settlers carried out with them little volumes of their favorite poets, and in the loneliness of bush-life began to write lyrics in imitation. Indeed, there is hardly an English or American poet of the Nineteenth Century whose voice has not been echoed in Australia—Wordsworth, Byron, Tennyson, Browning, Poe, and many others. But as time has gone on, Australian verse has more and more forgotten its models, and has assumed local color. Its themes are taken from incidents of the town and the bush. The poets sing of the "burning wastes of barren soil and sand." or, in another mood, of "the sunlit plains extended" and "the wondrous glory of the everlasting stars." The Australian singers of the Nineteenth Century number more than one hundred. The earliest was Barron Field, Judge of the Supreme Court of New South Wales, who published at Sydney, in 1819, *The First Fruits of Australian Poetry.* Among succeeding verse-makers were W. C. Wentworth, author of *Australasia;* J. D. Lang, Sir Henry Parkes, Charles Harpur (1812-68), known as the Australian Wordsworth, and Lionel Michael, author of *Songs Without Music* (1857). A new period for Australian poetry began with Adam Lindsay Gordon and Henry Clarence Kendall. Gordon, born in the Azores, in 1833, educated at Oxford, emigrated to South Australia, in 1851, taking leave of England in lines imitated from *Childe Harold.* He became a horse-dealer, horse-trainer, and the best steeplechase rider in the Colonies. His life was particularly pathetic, and he died by his own hand, in 1870. Gordon published three volumes: *Sea-Spray and Smoke-Drift* (1867), *Ashtaroth* (1867), and *Bush Ballads* (1870). In his sporting poems and narratives, based on his own wild experiences, we first get at the heart of Australia. The horse and the rider he glorified in ballads that have the ring of Scott and Macaulay. The Byronic influence never left him. His despair reaches intense expression in *Whither Bound?* Kendall was born at Ulladulla, New South Wales, in 1842. There, in the lonely bush, he passed his boyhood. His life was saddened by an inherited love for drink, which he mastered only after years of struggle. He died near Sydney in 1882. His first volume, *Songs and Poems* (1862), was followed by *Leaves from an Australian Forest,* containing his best work, and *Songs from the Mountains.* Of less force than Gordon, Kendall, 'the national poet,' sang with great beauty of the Australian hills, streams, and forests, in poems like "September in Australia," "The Hut by the Black Swamp," and "A Death in the Bush." Among the many other poets belonging to the last part of the Nineteenth Century are A. B. Paterson, Henry Lawson, Edward Dyson, Alfred Domett, J. Brunton Stephens, Miss Jennings Carmichael (afterwards Mrs. Francis Mullis), Ada Cambridge (afterwards Mrs. G. F. Cross), Charles Allan Sherrard, Alexander Sutherland, E. B. Loughran, J. B. O'Hara, William Gay, and George Gordon McCrae. All this verse compares favorably with what is now being produced by writers distinctively English or American.

Australia has offered fresh material to the novelist. Just as in poetry, the novel was at first imitative. Read the Australian novelists, and you feel the presence of Dickens, Charles Reade, Bret Harte, and Stevenson. Not until recently has Australia abandoned open imitation. Up to 1901, Australia had produced nearly three hundred novels and tales, without counting the many sketches that never got beyond the newspapers. The earliest, which appeared at Sydney from 1840 to 1850, are melodramatic, having as hero the escaped convict, or bushranger. In the next decade the convict and the picturesque cut-throat found a rival in the gold-digger, a much better hero. At this time some passable work in fiction was done by Miss C. H. Spence, afterwards known as a lecturer in England and America. Henry Kingsley (1830-76), brother of Charles Kingsley, went out to the gold-fields in 1853. At Langawilli, in West Victoria, he wrote *Geoffry Hamlyn* (published 1859), the best novel yet written dealing with Australia. Rolf Boldrewood (the pen-name of Thomas Alexander Browne) is, perhaps, the national novelist. Born in London in 1826, he was brought to Australia in 1830, and was educated at Sydney College. He formed a cattle-station in the wilderness, was for a long period police magistrate and gold-fields warden in New South Wales, and thus gathered material for a succession of faithful and stirring pictures of life as he had observed it. The grim struggle of the squatter is powerfully depicted in *The Squatter's Dream* (1890); outlawry, in *Robbery Under Arms* (1888); and the gold-digger, in *The Miner's Right* (1890). As in England and the United States, some very fine work has been done by women. Ada Cambridge (Mrs. G. F. Cross) is, perhaps, best known. At the age of twenty-six (1870) she went to Australia with her husband, and has lived there ever since, mostly in the bush districts of Victoria. In *The Three Miss Kings* (1891), she conceived the notion of depicting the life of three girls, brought up in a picturesque bush home, and their subsequent career. Mrs. Cross has also succeeded admirably with the problem-novel, as in *A Marked Man* (1890). Her other novels comprise *My Guardian* (1877), *In Two Years' Time* (1879), *A Mere Chance* (1882), *Not All in Vain* (1892), *A Little Minx* (1893), *A Marriage Ceremony* (1894), *Fidelis* (1895), *A Humble Enterprise* (1896), *At Midnight* (1897), and *Materfamilias* (1898). Mrs. Campbell Praed, born 1851, a native of Queensland, has published about twenty-five novels. In their stern and pessimistic outlook, they resemble the work of Hall Caine and Thomas Hardy. A typical novel is *Longleat and Kooralbyn* (1887). Other novels are *Miss Jacobsen's Choice* (1887), *The Romance of a Station* (1889), and *As a Watch in the Night* (1900). Madame Couvreur, better known by her pen-name, Tasma, passed many years in Victoria. She returned to England in 1879, and ten years later published *Uncle Piper of Piper's Hill.* She wrote two other good Australian stories—*In Her Earliest Youth* (1890), and *Not Counting the Cost* (1895). Hardly sure of her footing, Tasma dealt with the problems of education and heredity. Mary Gaunt (Mrs. Lindsay Miller) has cultivated chiefly the short story, in the way of sketches contributed to the Melbourne newspapers. A selection from these was published under the title *The Moving Finger* (1895). Of her longer novels, may be cited *Dave's Sweetheart* (1894). Guy Boothby gained wide popularity with *The Beautiful White Devil* (1896) and *Dr. Nikola* (1896), and has maintained it. Among the most read of the Australians is deservedly Louis Becke. He has written alone, and in collaboration with Walter Jeffery, a number of stirring adventures, first in the Stevenson and then in the Conrad style; such as *By Reef and Palm* (1896), *Pacific Tales* (1897), *Wild Life in the Southern Seas* (1897), and *The Mutineer*

(1899). Becke and Jeffery are journalists as well as novelists.

In general literature, Australia has had only one noteworthy name—Marcus Clarke. Born in Kensington, in 1846, he went to Melbourne at the age of 18, and after a short and successful career died in 1881. He contributed many sketches to various journals and Christmas books, and founded two periodicals, which soon came to an end. Admirable are his many short, realistic pieces, as *Pretty Dick* (an idyl), *How the Circus Came to Bullock Town*, *Gentleman George's Bride*, and others of the same type. He wrote pantomimes, comedies, burlesques, and several pamphlets. To the *Australasian* he contributed, under the name of the 'Peripatetic Philosopher,' a series of brilliant and humorous observations on society. He was also facile at burlesque in rhyme. But the work by which Clarke is best remembered is *His Natural Life* (1874)—a novel, in which are depicted the brutalities of the prison settlements.

Consult: Turner and Sutherland, *Development of Australian Literature* (New York, 1898); Byrne, *Australian Writers* (London, 1896); Martin, *Beginnings of an Australian Literature* (London, 1899); Sladen, *Australian Poets, 1788-1888*, an anthology (New York, 1890); and *Australian Ballads*, in Canterbury Poets (London, 1885-90). See BECKE, GEORGE; BOOTHBY, GUY; and CAMBRIDGE, ADA.

AUSTRALIAN OATS. See RESCUE GRASS.

AUSTRASIA, ạs-trā'shĭ-ȧ (Med. Lat., from OHG. *ōstar*, eastern), or THE EAST KINGDOM. The name of the eastern possessions of the Merovingians, which extended from the boundaries of Thuringia and Bavaria to the rivers Meuse and Scheldt. Metz was its capital and Verdun its most western town. Its population was almost wholly Germanic. The designation arose after the death of Clotaire I. in 561. Under the Carolingians the name disappears. See BURGUNDY; NEUSTRIA.

AUSTRIA, ARCHDUCHY OF. The cradle and nucleus of the Austrian Empire. It lies on both sides of the Danube, from the mouth of the Inn to the borders of Hungary, and embraces the crown-lands of Lower and Upper Austria and Salzburg (q.v.).

AUS'TRIA-HUN'GARY, or, officially, THE AUSTRO-HUNGARIAN MONARCHY (Med. Lat. *Austria*, from Ger. *Oesterreich*, eastern realm + Hungary). The largest European country after Russia and the Swedish-Norwegian monarchy. It forms a compact territory in southern Europe, lying between latitudes 42° and 51° N. and between longitudes 9° 30′ and 26° 30′ E., and is bordered for a shorter distance by the sea than any other great European State. Its coast-line comprises the greater part of the eastern shore of the Adriatic, the bulk of the country receding to a great distance from the sea. It is irregularly bounded on the north by Saxony, Prussia, and Russia; on the east by Russia and Rumania; on the south (including Bosnia and Herzegovina) by Rumania, Servia, and Montenegro; on the southwest by the Adriatic Sea and Italy, and on the west by Switzerland and Bavaria. The former Turkish provinces of Bosnia and Herzegovina, though, in an official sense, merely occupied and administered by Austria-Hungary, and not reckoned as an integral part of the Empire, must be regarded now as virtually incorporated in it. The total area of the Austrian dominions, not including the 23,262 square miles occupied by the two provinces just mentioned, is 240,942 square miles, nearly half of which (115,903 square miles) is occupied by the crown-lands represented in the Austrian Reichsrat, Vienna, and the greater half by the Kingdom of Hungary or the lands represented in the Magyar Parliament, sitting at Budapest. The greatest length from east to west is about 800 miles; greatest breadth from north to south, 650 miles. The following are the area and population, in 1890 and 1900, of the several divisions of the monarchy:

CROWN-LANDS	Area in square Miles	Population, in 1890	Population, in 1900	Density, in 1900
Lower Austria	7,654	2,661,799	3,086,382	403.2
Upper Austria	4,631	785,831	809,918	174.9
Salzburg	2,767	173,510	193,247	69.8
Styria	8,670	1,282,708	1,356,058	155.3
Carinthia	4,005	361,008	367,344	91.4
Carniola	3,856	498,958	508,348	131.8
Coast Districts (Görz and Gradisca, Trieste, Istria)	3,084	695,384	755,183	244.8
Tyrol and Vorarlberg	11,324	928,769	979,878	86.5
Bohemia	20,060	5,834,094	6,318,280	314.9
Moravia	8,583	2,276,870	2,435,081	283.7
Silesia	1,987	605,649	680,529	342.4
Galicia	30,307	6,607,816	7,295,538	240.0
Bukowina	4,035	646,591	729,921	180.8
Dalmatia	4,940	527,426	591,597	119.9
Hungary and Transylvania	108,258	15,231,527	16,768,143	154.9
Croatia and Slavonia	16,773	2,201,927	2,397,249	142.9
Fiume	8	30,337	38,139	4767.3
Total	240,942	41,359,204	45,310,835	188.0

The last three divisions constitute the lands of the Hungarian Crown. The provinces represented in the Reichsrat of Vienna are called collectively Cisleithania, or the 'country on this side of the Leitha' (a small stream forming part of the boundary between Lower Austria and Hungary), while the Hungarian half of the monarchy is called Transleithania, or the 'country beyond the Leitha.'

The density of population of the whole country in 1890 was 171 to the square mile. The increase of population during the last decade of the century was, therefore, about 9 per cent.

TOPOGRAPHY. Austria-Hungary is one of the most mountainous countries of Europe. The mountains are comprised in three great systems—the Alps, the Carpathians, and the Bohemian Highlands, which embrace the Sudetic Mountain System, the principal member of which is the Riesengebirge (Giant Mountains), the Erzgebirge (Ore Mountains), the Böhmerwald, and a few minor ranges. The Alps cover the crown-lands of Tyrol, Salzburg, Carinthia, Carniola, Styria, and the parts of Upper and Lower Austria south of the Danube. The eastern spurs of the Alps stretch through Croatia toward the southwestern part of Hungary. The total area of the Austro-Hungarian Alps is estimated at about 40,000 square miles, of which nearly 700 square miles are covered with glaciers. Their highest peaks are in the Rhætian and Noric Alps, which extend from Switzerland to the Danube. The Ortler Spitze, the loftiest summit in Austria-Hungary, rises to a height of nearly 12,800 feet. The Carpathian Mountains, greatly inferior to the Alps in height, describe an immense curve, amounting to two-thirds of a circle, about Hungary, girding it on the north and east, and covering an extensive area in Transylvania. In their broad sweep of above 800 miles, from the Danube at Pressburg back to that river at the Iron Gates, they embrace the vast Hungarian plain, a region more level than the prairies of the United States. The highest peak of the Carpathians is the Gerlsdorfer Spitze, about 8700 feet. At the head of the Adriatic is the remarkable highland region, of limestone formation, known as the Karst. On the borders of Dalmatia and Bosnia is a mountain range which bears the name of the Dinaric Alps. The mountains of Austria-Hungary are famous for their picturesque scenery, and abound in caverns, some of them very large. The Adriatic coast-land, with its many islands, its bays, and frowning heights, is one of the most picturesque regions in Europe.

Hydrography. Among the rivers of Austria-Hungary, the Danube is the most important, and is second only to the Volga in all Europe, its basin embracing about three-fourths of the total area of the country. It enters Upper Austria at Passau, and crossing Lower Austria in an easterly direction, enters Hungary, which it traverses eastward to the Bakony Forest, then turns abruptly and flows due south to the border of Croatia, where it receives the Drave, then flows again eastward, receives from the north its principal affluent, the Theiss, and from the west the Save, and at the Iron Gates breaks through the farther extremity of the Carpathian range, to descend thence into the great plains of Rumania and Bulgaria. The Danube is a very important factor in the economic life of the country, affording the largest navigable waterway. Besides the Danube there are several large rivers in Austria-Hungary. The Theiss, with its largest tributary, the Maros, collects all the waters of eastern Hungary, and delivers them to the Danube at Titel. Two other great tributaries of the Danube, the Drave and Save, collect the drainage of Croatia, Slavonia, Bosnia, Carniola, Carinthia, and a great part of Styria, since the high mountains bordering the Adriatic coast prevent any streams from the interior reaching that sea. The Elbe drains most of Bohemia, while the Dniester traverses eastern Galicia, and the Vistula forms part of the boundary line between Russian Poland and Galicia. The Inn traverses northern Tyrol, and the Adige flows through the southern part of that province. The lakes are comparatively few and insignificant. The most important are the Plattensee and the Neusiedlersee, in the western part of Hungary. There are numerous small lakes, especially in the Alps, some of them situated at an altitude of over 7000 feet, and famous for their scenery. The uneven surface of Austria-Hungary is not favorable for the construction of artificial waterways, and the canals of the country are few and comparatively unimportant. The Franzens Canal is the longest (137 miles), and connects the Danube with the Theiss. Austria-Hungary is famous for its hot and mineral springs, of which there are over 2800, mostly situated in Bohemia, Hungary, and Transylvania. The most important of them are Karlsbad, Marienbad, and Teplitz (Bohemia).

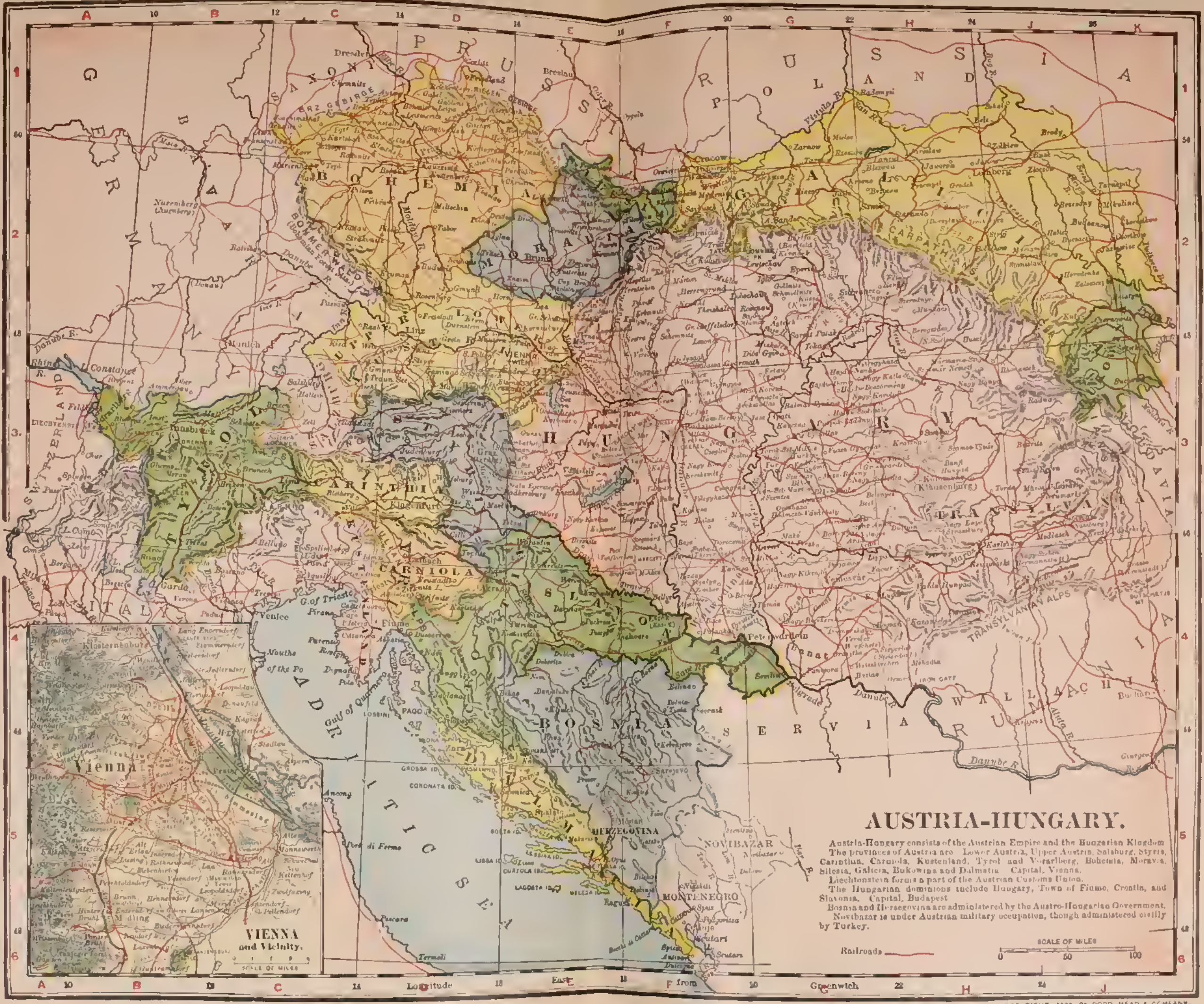
Climate. The climate of Austria-Hungary, while generally mild, differs considerably in different localities, owing to the uneven surface of the country. The average annual temperature varies from 62° F. in Ragusa, in the southern part of Dalmatia, to 51° in Budapest, and 48° at Prague. The northern Carpathians are characterized by very cold winters and cool summers, while in the valleys of Transylvania the winters are very severe and the summers very hot. The mean annual temperature of Vienna is about 50° F. The rainfall is very abundant, and at times excessive, in the western part of the country, near the Alps, where in some places the total annual rainfall exceeds 100 inches; it is lowest in Lower Austria, Moravia, and Silesia, averaging about 25 inches per year.

Fauna. The geographical position of Austria as a part of southern Central Europe gives it the fauna characteristic of its latitude, and there is little that is locally characteristic or different from that of the neighboring countries. The valley of the Danube forms one of the recognized migration highways for birds, between Northeastern Europe and Southern Asia; and the river abounds in fish that ascend from the Black Sea, furnishing important fisheries, of which that for sturgeon is notable. The valley regions have been largely denuded of wild animals by the civilization that has occupied them for so many centuries; but in the high Alps the chamois and ibex still survive in considerable numbers under legal protection; and the other high mountains still shelter bears, lynxes, wolves, and representatives of most of the species of smaller animals which originally dwelt there.

Flora. The flora of Austria-Hungary is characterized by great diversity and richness. It may be divided into vertical zones regulated by relative altitude on the mountains, from the fig and grape-producing southern valleys to the Alpine summits. In the west the general flora is much like that of southern Germany, but on the lower Danube and near the Adriatic trees and plants of a warmer climate prevail.

Geology. In its geological structure, Austria-Hungary shows as much variety as in the formation of its surface. Archæan rocks are represented by gneiss, schist, and granite in the Alps, Bohemian Highlands, and Carpathians, and are noteworthy for their mineral riches. The Silurian formation underlies a large area in Central Bohemia, where are located the celebrated silver mines of Pribram, and is also prominent in the Alps and in Galicia. The Devonian formation occurs in Moravia, Galicia, and the Alps. Carboniferous strata, frequently inclosing coal-beds, are found in Central and Western Bohemia, in Moravia, Silesia, Galicia, Styria, and Hungary (Eibenthal). Rocks of later age are represented by Triassic, Jurassic, Cretaceous, Tertiary, and alluvial beds, as well as by igneous intrusions. The Tertiary strata are of great economic importance, as they inclose valuable deposits of lignite and salt, and also are intersected by igneous dikes that carry the gold and silver ores of Schemnitz, Kremnitz, and Nagy-Bánya.

Mining. The mining industry of the monarchy dates centuries back, and some of the mines are believed to have been worked by the Celts and the Romans. The mineral deposits are remarkably rich and varied, including almost every known mineral, besides many kinds of precious stones, mineral oil, and useful earths. Gold is found mainly in Hungary proper and Transylvania, while silver occurs in Hungary, Tran-



AUSTRIA-HUNGARY.

Austria-Hungary consists of the Austrian Empire and the Hungarian Kingdom.

The provinces of Austria are Lower Austria, Upper Austria, Salzburg, Styria, Carinthia, Carniola, Kustenland, Tyrol and Vorarlberg, Bohemia, Moravia, Silesia, Galicia, Bukowina and Dalmatia. Capital, Vienna.

Liechtenstein forms a part of the Austrian Customs Union.

The Hungarian dominions include Hungary, Town of Fiume, Croatia, and Slavonia. Capital, Budapest.

Bosnia and Herzegovina are administered by the Austro-Hungarian Government.

Novibazar is under Austrian military occupation, though administered civilly by Turkey.

Railroads

SCALE OF MILES

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sylvania, Bohemia, and Tyrol, and quicksilver in Carniola (Idria). Iron is the most important metallic product of the monarchy, and is worked mainly in Bohemia, Moravia, Styria, and in many parts of Hungary. Copper is found in Tyrol, Salzburg, Transylvania, and Hungary Proper; lead occurs mainly in Bohemia, Carinthia, Galicia, and Hungary. The most important and the most common mineral of Austria-Hungary is coal, which constitutes over 80 per cent. in value of the total mineral production of Austria and over 40 per cent. of that of Hungary. While coal is found in almost every province of the Empire, the greater part of the output comes from Bohemia, which produces more than one-half of the mineral products of Austria and nearly one-third of its metal products. Rock salt exists in immense beds on both sides of the Carpathians, in the county of Mármaros in Hungary, in Transylvania, and in Galicia. The salt mines of Wieliczka in Galicia are the most famous in the world. Salt is also made by State salt-works by evaporating the water of salt-springs, and from the sea-water on the coasts of the Adriatic. The sale of salt in Austria is a Government monopoly. Of other salts, alum, sulphate of iron, and sulphate of copper are the most important. The useful earths include all sorts of clay up to the finest porcelain earth (in Moravia, Bohemia, and Hungary). Of precious and semi-precious stones the most abundant are the Hungarian opal (which passes in commerce as Oriental), Bohemian garnet (the finest in Europe), carnelian, agate, beryl, amethyst, jasper, ruby, sapphire, topaz, etc. In 1885 oil-wells of great productiveness were opened at Kolomea, in Galicia, and heavy import duties were soon laid on petroleum for the benefit of these wells and in order to encourage refining. Considerable deposits of zinc, tin, manganese, bismuth, sulphur, arsenic, uranium, nickel, and graphite are also found in the various parts of the monarchy.

The following table, compiled from official reports, shows the progress of mining in Austria and Hungary during the last decade of the century:

	Metric Tons Where Pounds Not Given			
	Austria		Hungary	
	1890	1899	1890	1899
Gold (lbs.)	46	168	4,698	6,766
Silver "	79,100	87,300	37,590	46,300
Copper "	1,000	1,100	275	165
Lead "	8,300	9,700	1,255	2,200
Zinc "	5,400	7,200	76	....
Pig Iron	666,000	872,000	295,507	452,000
Lignite Coal	15,329,000	21,752,000	2,249,098	4,293,000
Coal	8,931,000	11,455,000	994,812	1,239,000
	1895	1899	1895	1899
Petroleum	188,600	323,000	2,083	2,125
Salt	278,900	342,000	169,400	182,600

	Value			
	Austria		Hungary	
	1890	1899	1890	1899
Gold	$ 14,600	$ 38,000	$1,486,500	$2,042,000
Silver	1,534,840	773,000	767,000	493,000
Copper	301,100	374,000	79,000	48,500
Lead	699,800	760,000	90,000	150,000
Pig Iron	13,650,300	13,550,000	5,670,000	6,930,000
Zinc	733,900	820,000	2,500	....
Lignite Coal	13,819,600	19,319,000	3,418,000	5,948,000
Coal	15,200,600	23,254,000	2,416,000	2,640,000
	1895	1899	1895	1899
Petroleum	1,789,000	3,334,000	28,500	21,800
Salt	5,526,000	10,277,000	5,450,000	5,480,000

The annual value of the products of the mines of Austria increased from about $55,000,000 at the beginning of the decade to nearly $75,000,000 at its close. The annual value of the metallurgical products amounts to about $20,000,000. The total annual value of the mineral output of Hungary for the same period advanced from about $20,000,000 to nearly $25,000,000. The number of persons employed in both the mines and the furnaces in Austria is nearly 150,000, about 5 per cent. of this number being women and less than that boys. In Hungary about 55,000 persons are employed in the same industries, with a similar proportion of women and boys. About 36 per cent. of the men are employed in the metal mines, 39 per cent. in the coal mines, and 25 per cent. in the iron and steel works.

Agriculture. Rich soil, abundance of water, and a mild climate have combined to make Austria-Hungary one of the foremost agricultural countries in Europe. Its crops are remarkable for their variety, embracing, besides all the common European products, a great many sub-tropical plants and fruits. The most fertile lands are those in Hungary, Bohemia, Moravia, Lower and Upper Austria, and Galicia. Fully 95 per cent. of the total surface of the monarchy is productive, and is distributed as follows:

	Acres	Per Cent.
Arable land	58,129,190	37.84
Meadows	16,152,275	10.51
Orchards	1,909,324	1.24
Vineyards	1,665,017	1.08
Forests	46,721,767	30.39
Rivers and lakes	511,457	0.33
Pastures	20,700,066	13.46
Total productive area	145,789,096	94.85
Unproductive area	7,923,358	5.15
Grand total	153,712,454	100.00

With the great variety in climatic and topographical conditions of the monarchy, ranging from the sunny slopes of the Adriatic coastland to the snow-clad Alpine mountains, and from the vine-laden hills of the Tyrol in the west, to the broad, fertile plains of Hungary in the east, the agricultural products of Austria-Hungary offer as great contrasts as can be found between those of any two countries of Europe. The eastern half, or Hungary with its dependencies, serves as the granary of the monarchy, besides exporting considerable quantities of grain to South Germany and Switzerland. The western half, or Austria, produces everything from wheat

Products	Austria Bushels	Hungary Bushels	Empire Bushels
Wheat	46,543,000	129,129,000	175,672,000
Rye	80,117,000	46,884,000	127,001,000
Barley	53,865,000	6,252,000	60,117,000
Oats	100,521,000	57,109,000	157,630,000
Corn	17,510,000	96,719,000	114,229,000
Buckwheat and Millet	4,634,000	2,852,000	7,486,000
Potatoes	326,455,000	98,490,000	424,945,000
	Pounds	Pounds	Pounds
Flax	89,066,000	18,959,000	108,025,000
Hemp	44,092,000	119,048,000	163,140,000
Tobacco	7,716,000	116,182,000	123,898,000
Hops	14,771,000	1,764,000	16,535,000
	Tons	Tons	Tons
Beet roots	4,310,000	894,500	5,204,500

to sub-tropical fruits, but it depends for most of its grain supply on Hungary. Its main efforts are devoted to the raising of industrial plants, such as beet-root, tobacco, flax, hemp, rape-seed, hops, barley, potatoes, etc. The varied nature of the two halves of the monarchy may be seen from the foregoing table of their average annual products.

Thus it will be seen that Austria furnishes only about one-fourth of the total wheat crop of the country, about one-seventh of the corn, and less than one-fifteenth of the tobacco crop. If, in addition to this, it be remembered that even these small figures include the crops of Galicia, which geographically belongs to the eastern half of the monarchy, and whose products of wheat, corn, and tobacco constitute one-third, one-fourth, and two-thirds of the total respective crops of Austria, the latter's share in those crops will be seen to be very small indeed. On the other hand, Austria furnishes nearly two-thirds of the rye crop of the monarchy and over three-fourths of the potato crop, both of which go largely to feed the distilleries. The same is true of its proportion of the hops and barley consumed by the breweries, and of the beet crop, raised for the sugar refineries. Austria and the lands of the Hungarian Crown devote about an equal area to vine growing. This is on the decline in Hungary, the area under cultivation having shrunk from about 915,000 acres in the early eighties to about 500,000 acres in the early nineties. Still Hungary continues to stand first in the quality of the wine produced, and the whole of the monarchy is second only to France in the production of wine. Horticulture is carried to great perfection, and the orchards of Bohemia, Austria proper, Tyrol, and many parts of Hungary produce a profusion of fruits. The chief orchard products of the monarchy, in the order of their commercial importance next to grapes, are plums, peaches, apricots, apples, nuts, almonds, chestnuts, and figs, great quantities of which are exported annually. In Tyrol, Dalmatia, and Southern Hungary, olive and mulberry trees are successfully raised and are gaining in area of cultivation. Rice is cultivated in the Hungarian district of the Banat, but not enough for home consumption. Potatoes are raised everywhere, and in elevated districts are often almost the sole subsistence of the inhabitants. Great quantities of cider are made in Upper Austria and Carinthia, and of plum brandy in Slavonia. In Dalmatia oranges and lemons are raised; twice as much olive-oil is imported as is produced in the country.

Stock-breeding is no less important than the cultivation of the soil, being largely developed in the Alpine Highlands and in the Hungarian plains, in both of which pastures are abundant and the land is best adapted for grazing purposes. In spite of this fact, not enough cattle are raised to satisfy the home demand. The number of cattle in the monarchy has remained practically stationary, at about 15,000,000 for the last two decades, and in proportion to the number of inhabitants is less than in Denmark, Norway, Sweden, and Great Britain. Sheep-breeding has suffered a great decline from the competition of Australian wool. From more than 20,000,000 in 1869, the number of sheep fell to less than 15,000,000 in 1884, and less than 12,000,000 in 1895. The breeding of sheep, like that of horses, has been a special object of care to the Government. The finer wools are furnished by Moravia, Bohemia, Silesia, Lower Austria, and a great part of Hungary and Galicia. The great mass is, however, composed of what is known as middling and inferior sorts. Goats are reared chiefly in Dalmatia, and swine in Hungary. The pride of Austro-Hungarian stock-breeders is their horses, which are among the finest in Europe, and whose number (about 3,500,000) in the monarchy is second only to that in Russia and Germany. Horse-breeding is promoted by what are called 'military studs.' Besides a number of imperial studs, there are a great many private establishments, especially in Hungary, for the same purpose.

Forestry is one of the most important industries in Austria-Hungary, over 30 per cent. of whose surface is under forests, making the monarchy second only to Russia in that respect. Of the total area of forest in Austria, more than two-thirds is under pines and other trees found in high altitudes, and in Hungary the proportion is about the same. The forests are chiefly situated in the Carpathians, Alps, and other mountains of the country. The administration of the forests and domains belonging to the State is under control of the ministry of agriculture, and includes schools of forestry; and the exploitation of the forests is subject to restrictive regulations. The average annual yield of the forests exceeds 1,050,000,000 cubic feet of lumber, over 40 per cent. of which is used for manufacturing and building purposes, and less than 60 per cent. as fuel. The extensive forests, besides timber, yield a number of secondary products, as tar, potash, charcoal, bark, cork, etc.

The land distribution in Austria-Hungary differs in its several parts. In Galicia, Bukowina, and to a considerable extent in Hungary, where the cultivation of wheat and cattle and sheep raising constitute the chief branches of agriculture, large estates thrive best and occupy from 25 to 46 per cent. of the total area under farms. Nearly 87 per cent. of the peasants, however, own their farms. But these are often not large enough to yield a living, and their owners often depend for that on employment as day laborers on the neighboring large estates, or in the nearby countries of Germany and Russia. On the other hand, in Dalmatia and Southern Tyrol, where fruit-raising, wine-making, and silk culture constitute the chief occupation, small farms are most successful and the peasants are most prosperous, owning from 92 to 97 per cent. of the land. In the remaining crown-lands peasant holdings occupy about three-fourths of the total agricultural area.

Manufactures. The industrial development of Austria-Hungary has been advancing with rapid strides for the last few decades, and in many cases this has been due to the material support received from the Government in direct subventions, reduced freight rates on State railways, and exemption from import duties on raw products and machinery used in the industries. The following are the 10 most important industries in the country, employing more than 100,000 persons each: (1) The clothing industry, with nearly 800,000 workers—less than one-fourth of whom are employed in Hungary, and the rest in Austria. (2) Manufacture of foods and drinks, nearly 600,000 people, one-fifth of them in Hungary. (3) The textile industry, nearly 500,000 persons, less than one-fifteenth employed in Hungary. (4) Building trades, nearly 400,000, less than one-fourth of whom are employed in Hungary. (5) Some 325,000 people are engaged in wood-working, less than a third of them in Hungary. (6) The iron and steel works of the monarchy furnish employment to 300,000 people, nearly 30 per cent. of whom are in Hungary. (7) The quarries and potteries of the monarchy keep some 150,000 people busy, less than one-tenth of them in Hungary. (8-10) Finally, machine-building and tool and implement making, and the paper and leather industries each give work to more than 100,000 people; less than one-third of these are employed in Hungary.

The mere enumeration of the principal industries of Austria-Hungary shows the overwhelming industrial importance of Austria in the monarchy. It is this industrial diversity of Austria and Hungary that makes the monarchy more or less self-sufficient, the two halves depending upon exchange with each other for their material well-being. The chief seats of industry in Austria are Bohemia, Silesia, Moravia, and Lower Austria. In Hungary, Budapest is the heart of industrial activity, 40 per cent. of the Hungarian factory population being employed there; yet the number of Budapest's manufacturing establishments constitutes but 10 per cent. of the total in Hungary, which shows that most of the large modern factories and mills of Hungary are located in its capital.

The most important industries in the monarchy that are carried on on a large scale, and play a leading part in the commercial and financial life of the country, are the textile and iron and steel industries. The most ancient branches of the textile industry are the spinning and weaving of wool and linen, for both of which the country produces abundant raw material. The maintenance of these industries has always been an object of special solicitude with the people of Austria, because it not only furnishes employment to the manufacturers and their workmen, but also affords an outlet to the wool and flax crops of the country. But although the wool and linen industries are still very flourishing, their relative importance is receding before the rapidly growing cotton industry. The raw cotton is imported from the United States and India, and is converted into finished products in the spinning, weaving, bleaching, dyeing, and printing establishments of the monarchy. The growth of the industry is best shown by the increasing quantity of raw cotton consumed from year to year. In 1831 the imports of raw cotton amounted to 12,456,000 pounds; in 1858 they rose to 87,523,000 pounds. Cotton was seriously threatening the very existence of the linen industry, when the breaking out of the Civil War in the United States, with the consequent cotton famine, gave the linen industry a chance to revive. After the war the cotton industry took a new lead, and the imports of cotton jumped to 132,739,000 pounds in 1871, 245,482,200 pounds in 1891, and 358,269,500 pounds in 1898. The silk industry is also making rapid strides, owing chiefly to the increased cultivation of the silk-worm in Hungary. Formerly the seat of silk manufacture was largely centred in Southern Tyrol and the neighboring region; now there are large silk-spinning establishments in Szegszárd, Pancsova, and Neusatz, in Hungary, in which country about 86,000 families were engaged in the production of raw silk in 1894, as against only 100 families in 1879. All of the textile products enumerated constitute an important item of export from Austria-Hungary.

The iron and steel industry of Austria-Hungary is abreast of the times in its modern methods of manufacture. The production of pig, cast, and wrought iron, Bessemer steel, iron bars, etc., although large, is barely sufficient to cover the home demand on the part of the manufacturers of steel rails, iron plate, steel wire, etc., besides the numerous comparatively smaller manufactures of all kinds of metallic ware. In addition there is the very important machine-building industry, which includes the manufacture of locomotives, argicultural machinery, and all kinds of machinery used in modern manufacturing establishments. How inadequate most of these products are to meet the domestic demand, in spite of their great increase in the course of the last decade, is to be seen from the following figures, which show that, with a few exceptions, the imports of these products are greater than the exports:

PRODUCTS	1888 Imp'rts Tons	1888 Exp'rts Tons	1898 Imp'rts Tons	1898 Exp'rts Tons
Pig iron	……	……	190,300	18,000
Bar iron	9,500	12,000	35,400	39,100
Steel rails	500	800	2,100	2,800
Tin plate	3,300	2,200	14,800	10,800
Iron and steel wire	1,000	800	3,900	1,400
Iron, steel ware and machinery	(1891) 46,600	(1891) 27,500	57,300	49,900

The milling industry is still carried on to a considerable extent by small establishments, in which the motive power is wind or water, but there are now thousands of steam mills, most of them in Hungary. Some of them, as those in Budapest, are on a large scale.

In 1890 there were 106,616 distilleries, the great mass being diminutive stills, of which 27,055 were in Austria and 79,561 in Hungary. In 1898, out of 30,637 distilleries in Austria, only 600 used any kind of machinery, and a similar proportion held in Hungary. But of the 25,434,000 gallons produced by the 79,010 distilleries of Hungary in 1896, 24,884,000 gallons, or 97.8 per cent. of the total product, were turned out by 501 distilleries, or by about one-half of 1 per cent. of all the distilleries. The number of breweries is on the decrease, because the small breweries are crowded out of existence by their new large rivals. In 1865 there were 3143 breweries; in 1880 there were 2217; in 1890, 1859 (1761 in Austria and 98 in Hungary); in 1898 the number declined further to 1614. The annual output of the Austro-Hungarian breweries fluctuated between 317,000,000 and 370,000,000 gallons, and is behind only that of Germany and Great Britain in all Europe.

The beet-sugar industry is one of considerable importance in Austria, as well as in Hungary, and is fostered by the Government by a very liberal bounty system. In 1865 there were 147 refineries in the monarchy; the number grew to 215 (198 in Austria and 17 in Hungary) in

1890, and 234 (214 in Austria and 20 in Hungary) in 1898, and the annual output increased from 845,000 tons of sugar in 1890 to nearly 935,000 tons in 1898, which not only covers the entire domestic demand, but also furnishes a considerable surplus for export. The sugar industry gives employment to from 85,000 to 90,000 people, of which about one-sixth are employed in Hungary.

The glass industry is especially developed in Bohemia, whose products enjoy great fame and constitute a very important article of export from Austria-Hungary. The pottery products are also of importance, and include the most artistic and expensive porcelain and china ware. The chemical industry thrives especially in Bohemia, Silesia, Lower Austria, and Hungary, and its most important products are potash, sulphuric and hydrochloric acids, pharmaceutical goods, and dyestuffs and explosives. The manufacture of paper, carried on extensively, is rapidly growing throughout the monarchy, and furnishes large quantities for export, giving employment to some 25,000 people. The manufacture of friction matches is carried on extensively in Austria.

The leather industry sprang up at an early date, as a natural outgrowth of the country's enormous stock-raising, and has developed to such an extent as to require the importation of considerable quantities of hides from abroad; and yet it is unable to supply the domestic demand for leather, which also has to be imported in great quantities.

The manufacture of tobacco has constituted a Government monopoly since 1670. It is carried on in 43 factories, of which 28 are in Austria and 15 in Hungary, giving employment to upward of 50,000 working people, more than 90 per cent. of whom are women. The annual output of the Government factories aggregates about 1,600,000,000 cigars, 2,500,000,000 cigarettes, 88,000,000 pounds of tobacco, and 3,750,000 pounds of snuff, yielding a revenue of about $20,000,000 to the Austrian Government and nearly $12,000,000 to the Hungarian Government. The consumption of tobacco in the monarchy (3.3 pounds) per capita is behind that of Great Britain, the Netherlands, Belgium, and Switzerland, and is about the same as in Germany.

TRANSPORTATION. *Railways.*—The first steam railway in Austria, the Kaiser Ferdinand Nordbahn, 8 miles long, was opened in November, 1837, although a horse railway—the first ever built in Europe—had existed since 1825. The first line was built by a private company, and it was not till 1841 that the Government began to construct railways on its own account. In the meantime, the great prosperity of the country in the early forties, with its consequent abundance of idle capital seeking investment, stimulated the construction of many private lines, and sent up the prices of railway shares on the exchanges. The poor crops of 1845, however, and the commercial panic of 1846 which followed, made short work of this optimism, and prices tumbled, bringing ruin to many and leaving the railways in a pitiful plight. It was under these circumstances that the Government determined upon the policy of nationalizing the railways, and appropriated over $10,000,000—soon increased to $25,000,000—for buying up the shares of private railway companies; and in less than a year (September, 1847) the Government owned a controlling interest in four of the largest railways of the country—the Hungarian, the Lombardo-Venetian, the Gloggnitz, and the Oedenburg railways. The financial straits in which these railways found themselves forced the Government to pursue to an end the policy it had once begun, and to buy out the roads entirely. By September, 1854, the Government found itself in possession of 1100 miles of railways, or practically the entire mileage of Austria. In the following year, however, the Government suddenly reversed its policy, and began to dispose of its acquired lines, and by 1858 the total length of the State lines dwindled down to some 8 miles. This radical change in the railway policy of the Austrian Government, while partly due to official mismanagement under State control, was mainly caused by the fact that the Government needed a large amount of ready cash, in order to effect a change in its monetary standard. The following decade was marked by feverish activity in construction, due largely to indiscriminate grants of subventions by the Government to private companies. From 1860 to 1870 the length of private lines increased from 1815 miles to 3800 miles, while the proportion of subsidized roads increased from 20 per cent. at the close of the fifties to 75 per cent. in 1866. In 1873 the Austrian Government, partly influenced by the great drain upon its finances caused by the granting of subventions, and partly stimulated by the success of State railway ownership in Germany and in France, made an attempt to return to its former policy. As an initial step in that direction, a law was passed in 1877 conferring on the Government the right to take over, with a few exceptions, all the lines which had been receiving a subvention from the Government, or whose payment of interest had been guaranteed by it. The total amount paid out by the Government in the form of subventions and guarantees up to 1876 was about $49,000,000. Since 1877 the State has steadily increased its railways, both by construction and by purchase, so that at the close of 1898 it owned and controlled over 56 per cent. of the total railway mileage of Austria.

The experience of Hungary with its railways has been, in the main, the same as that of Austria, with the difference that the Hungarian Government, since the *Ausglcich* of 1867, has pursued the policy of State ownership and control with greater energy. The first steam railway in Hungary was opened in July, 1846, a line 21 miles long, from Budapest to Waitzen. At the end of 1899 the total length of the railway lines of Hungary was about 10,500 miles, of which

Year	AUSTRIA		HUNGARY	
	State (Miles)	Private (Miles)	State (Miles)	Private (Miles)
1850	516	325	120	17
1860	8	1817	....	1002
1870	8	3781	221	1935
1880	1221	5867	....	....
1890	4129	5359	3533	3440*
1899	6780	4976	4855	5767†

* Including 2000 miles operated by the State.
† Including 4000 miles operated by the State.

nearly 83 per cent. was owned or controlled by the Government. The foregoing table illustrates the growth of railway lines in Austria and Hungary during the last half century.

Merchant Marine. Cut off from the sea on all sides except for a small outlet on the Adriatic, Austria-Hungary naturally falls behind all of the leading European countries in her merchant marine. In 1899 this comprised 12,605 vessels of 220,021 tons in Austria, and 494 vessels of 63,117 tons in Hungary. Of these, Austria had 187 steamers of 161,924 tons. Austria employed altogether 32,575 seamen and Hungary but 2279. In 1884 the merchant marine of the entire monarchy consisted of 9206 vessels of 324,458 tons, employing 29,358 people; thus in fifteen years there was an increase of 42 per cent. in the number of vessels, but a decline in the total tonnage. In 1899, 125,000 vessels of 15,000,000 tons entered and cleared the 104 seaports of Austria-Hungary (of which 93 belonged to Austria and only 11 to Hungary), as against 85,000 vessels of 11,000,000 tons in 1891. Nearly 90 per cent. of these vessels carried the Austro-Hungarian flag, next in the order of importance being those of Italy, Greece, and Great Britain. The most important seaports are Trieste in Austria and Fiume in the Kingdom of Hungary. The Danube is navigated by a large number of steamboats throughout the whole of its course in Austria-Hungary, and affords a great outlet to the Black Sea.

Commerce. The lofty mountains surrounding the country on nearly all sides and the small extent of its coast-line are great obstacles in the way of development of foreign commerce. On the other hand, the great diversity of natural resources in the two halves of the monarchy is especially favorable to an active internal trade. For purposes of commerce and trade, Austria and Hungary form a single customs union, maintained by a mutual agreement. According to it the commercial relations of the two halves of the monarchy to each other and to foreign countries are exactly the same as in the case of the separate States of the United States: no import or export duties can be levied on goods going from one part of the monarchy to the other, and all duties on foreign goods are uniform throughout the country. Nearly 1,000,000 people are employed in commerce. Eighty-five per cent. of the entire foreign commerce is by land, and only 15 per cent. goes by water. The countries which share most in the trade with the monarchy are:

Germany	(about	75%	of the imports	and	70%	of the exports).
Italy	"	4½%	" "	"	5%	" "
G'r't Britain	"	3%	" "	"	3%	" "
Rumania	"	3%	" "	"	2%	" "
Russia	"	2½%	" "	"	4%	" "
U't'd States	"	2%	" "	"	2%	" "
Servia	"	1½%	" "	"	½%	" "

Next come France, Switzerland, Turkey, etc. The following figures show the growth of foreign commerce during the last decade of the Nineteenth Century:

	—Austria-Hungary—	
Year	Imports	Exports
1890	$207,000,000	$313,000,000
1895	289,000,000	301,000,000
1898	333,000,000	328,000,000
1900	342,000,000	388,000,000

These show an increase for the decade of nearly 68 per cent. in the value of the imports, but only of 24 per cent. in that of the exports. In 1900, of the total imports into the country, 57 per cent. was raw material, 14 per cent. half-finished products, and 29 per cent. manufactured goods. On the other hand, of the total exports during the same year, only 35 per cent. consisted of the products of land, forests, and fisheries; 7 per cent. represented products of the mines and half-finished products of smelting-works, etc.; and nearly 60 per cent. was manufactured goods. These few figures clearly show the predominating importance of manufactures over agricultural and mining products in the exports of the country, and reveal a tendency and growing ability to convert the raw products, both domestic and foreign, into finished products before calling in the aid of foreign manufactures for the satisfaction of the wants of the population. That this is a growing tendency is shown by the fact that there was an increase of 9 per cent. in the value of the imports of raw products in 1900 as compared with 1899, and at the same time a decline of 2 per cent. in the exports; while there was a falling off of 1.3 per cent. in the value of the imports of half-finished products and an increase of 6 per cent. in the exports; and a decrease of about one-half of one per cent. in the value of the imports of manufactured products and an increase of 5 per cent. in the exports.

The United States, as shown above, ranks sixth in the foreign commerce of Austria-Hungary, and, on the other hand, the latter country ranks tenth in our own foreign commerce. It is interesting to trace the growth of trade between the United States and Austria-Hungary during the last decade. In 1890 its total value was $12,906,000, in 1900 it increased to $16,126,000, or an increase of nearly 25 per cent. in a decade. But the exports of Austria-Hungary to the United States during that period suffered a decline of $2,500,000, or 21 per cent., while the exports of the United States to Austria-Hungary increased by nearly $6,000,000, or more than 33 per cent. The following table shows the fluctuations of the Austro-American trade during that decade:

Year ending June 30	Imports into Austria-Hungary from the United States	Exports from Austria-Hungary into the United States
1891	$1,311,000	$11,595,000
1892	1,527,000	7,719,000
1893	571,000	10,055,000
1894	528,000	6,896,000
1895	2,126,000	6,510,000
1896	2,440,000	7,644,000
1897	4,023,000	8,158,000
1898	5,697,000	4,717,000
1899	7,379,000	6,551,000
1900	7,047,000	9,080,000

The chief articles of import from the United States are cotton, and some machinery and other manufactured goods, while Austria-Hungary exports to us mainly beet sugar, glassware, pottery, furniture, millinery, jewelry, and beans.

Banking. The banking system of the monarchy is quite simple. It centres in the Austro-Hungarian Bank, with headquarters at Vienna and Budapest, 71 branches in the principal cities of the country, and agencies in many other towns. This bank has the exclusive privilege of issuing paper money, and to that extent exercises even a more complete control over the monetary situation of the monarchy than the Bank of England does over that country. It was organized in 1816, under the name of the "Austrian National Bank," and from the beginning was endowed with the great powers it now enjoys. Except for the period lasting from 1848 till the middle of the sixties, when the country's resources were drained to exhaustion by the ravages of the Revolution and foreign wars, it has enjoyed great prosperity during its entire existence, and has had a high reputation for stability and sound management. In 1877 it was recognized as the Austro-Hungarian Bank, in order to bring it into conformity with the new political status of the country. The capital of the bank is fixed at $36,540,000, and the resources have been growing all the time, as the following figures (taken at the close of the respective years) will show:

Assets	Millions of Dollars			
	1876	1885	1895	1900
Coin Reserve	55.463	80.711	99.101	235.000
Discounts	55.050	55.392	89.106	105.000
Loans on Securities	11.778	11.050	18.787	....
Mortgage Loans	40.812	36.284	54.522	....
Liabilities				
Capital Stock	36.540	36.540	36.540	....
Reserve Fund	7.233	7.348	13.214	....
Circulating Notes Outstanding	120.139	147.623	251.661	310.000
Mortgage Bond Outstanding	40.576	32.964	52.188	....

The most important bank next to the Austro-Hungarian Bank is the Austrian Credit Bank for Trade and Industry (*Oesterreichische Credit-Anstalt für Handel und Gewerbe*). Its functions are the same as those of the large private banking-houses of the United States; viz., the promotion of all kinds of industrial undertakings, and negotiating State and provincial loans. It was founded in 1855, with an authorized capital of $40,000,000, which was subsequently reduced to $16,000,000, and has branches in the largest cities of the country. Among the other important banks should be mentioned: The Lower Austrian Discount Company, organized 1853 ($4,000,000); the Anglo-Austrian Bank, organized 1864, capital $7,000,000; the Austrian Territorial Bank (Länderbank), organized 1880, with $16,000,000, mostly French capital, invested in railways, mines, and foreign loans; the Union Bank; and the General Austrian Mortgage Bank (Bodenkredit-Anstalt), organized 1864. The latter advances loans on real estate by issuing mortgage bonds, which are sold in the open market, so that it practically serves as an intermediary between the real-estate owners and the capitalist who does the actual advancing of money. Its usefulness to the former is in securing for him a lower rate of interest than he would otherwise have to pay, and to the latter in that it assumes the responsibility for the solvency of the debtor. It has proved an extremely useful institution, attracting a large amount of capital from abroad (chiefly France), and distributing it in the agricultural community which has stood in need of it most. Nearly all of these banks have branches throughout the country, thus extending their usefulness as far as possible. An account of the banking system of Austria would not be complete without mentioning the Vienna Clearing-House (*Giro und Cassen-Verein*), which, in addition to attending to ordinary clearing-house transactions (see CLEARING-HOUSE), performs many other services for banks and business firms. The growth of its transactions is shown by the following few figures:

	Annual Clearings
1873	$1,129,100,000
1880	2,369,200,000
1890	2,536,197,000
1894	3,293,633,000

In addition to the banks enumerated, there are a number of other banks of minor importance—savings, pawning, mortgage banks, etc. All in all, there are 44 joint-stock banks (besides branches and agencies) and 17 private banks in Austria, with a capital stock of more than $120,000,000. The comparatively small number of banks in the country is due to the fact that in Austria the system of branch banking is in vogue. In Hungary the system of small independent banks is more in favor, there being in 1900, 360 banks, with a total capital of about $77,000,000.

The postal savings-bank system has attained a fuller development in Austria-Hungary than in any other country. Besides the savings department proper, in which deposits are accepted for the smallest amounts, there is a check department, in which the minimum deposits are fixed at $40. The use of the post-office as a banking institution has proven of inestimable benefit to the business community, as the facilities thus afforded by the Government for out-of-town remittances, as well as for local payments, are far superior to those offered by any private bank. The postal savings department has thus been converted into a gigantic clearing-house for the entire country. The relative importance of the two departments is shown by the following figures: The number of depositors in the savings department proper increased from an annual average of 783,208 in 1883-90, to 1,527,265 in 1900; their deposits increased during the same period from $8,500,000 to $26,000,000. In the check department the number of depositors increased during the same period from 17,808 to 40,271, while the deposits increased from $14,000,000 to $41,000,000. The number of postal savings-banks in Hungary exceeded 4,200 at the end of the century, having 389,000 depositors and over $6,000,000 deposits. The private savings-banks numbered 550 in Austria, with more than 3,000,000 depositors; over $720,000,000 in deposits, and 731 banks in Hungary, with about $300,000 in deposits.

EDUCATION. Owing to the diversity of race and language which prevails in the various provinces of Austria, the system of public education presents many differences in the various crown-lands of the Empire. In general, the organization and management of all public institutions of learning in Austria (Cisleithania) are left to the provincial authorities; but these are required to conform to a uniform scheme of instruction established by act of the Imperial Parliament and applied by the minister of public instruction. School administration is under the supervision of local, district, and provincial boards, and district and provincial inspectors. The features common to all the crown-lands are the division of educational institutions into primary, secondary, and higher schools, and the very low cost at which instruction in schools of all grades is imparted. Characteristic, too, of all the Austrian provinces is the high degree of excellence which technical education has attained. The care of primary instruction is incumbent on the local communities, and attendance at the primary schools between the ages of 6 and 14 (in three provinces between 6 and 12) is compulsory. The course of instruction includes, besides the ordinary branches, the subjects of religion, physical training, and, in the case of girls, domestic science. In 1893 the number of national schools and grammar schools (*Volksschule*, *Bürgerschule*) in Cisleithania, in which elementary education was imparted, was 18,807, with a teaching force of 67,354 men and women and an enrollment of 3,160,837 pupils. In 1898 the number of schools rose to 19,735, the number of teachers to 74,783, and the number of pupils to 3,483,646.

Above the elementary schools are the *Gymnasia* and the *Realschulen*, offering courses of eight and seven years respectively. The *Gymnasia* prepare for the universities, the *Realschulen* for the technological institutes. For the support of the secondary schools, the State, the provinces, and the larger communes coöperate. In 1896 there were 182 *Gymnasia*, with a teaching staff of 3699 and an attendance of 59,975, and 84 *Realschulen*, with 1579 teachers and 26,429 students. In 1901 the number of *Gymnasia* was 212 and the attendance 69,788, while the *Realschulen* had increased to 106 in number, with 35,192 students; in other words, the number of pupils in the *Realschulen* increased at a rate almost double that in the *Gymnasia*. Universities of Cisleithania, eight in number, supported by the State, are located at Vienna, Prague (two, German and Czech), Gratz, Innsbruck, Cracow, Lemberg, and Czernowitz. Each comprises faculties of theology, jurisprudence and political science, medicine, and philosophy. The universities at Vienna and Cracow and the German University at Prague, date back to the Fourteenth Century; and of these, the first ranks among the foremost universities of the world, especially as to its faculty of medicine. In 1893 the number of professors and tutors in all these universities was 1140 and the number of students 13,528. In 1901 the combined faculties included 1395 instructors, and the students numbered 17,132, showing an increase of nearly 25 per cent. in the student body and teaching staff. The number of students at the University of Vienna, in 1900, was 6981. In 1898 56 theological seminaries (of these 42 Catholic) gave instruction to 1978 students. Of the technological institutes, the most important are the six State high schools at Vienna, Prague (two), Gratz, Brünn, and Lemberg; and the mining academies at Leoben and Pribram. In addition, there are numerous schools of agriculture, forestry, and mining, industrial schools, military and naval academies, and schools of fine arts and music. In all, the special schools of Austria in 1898 numbered 3599, with a recorded attendance of over 225,000 students. General culture is highest in the German-speaking provinces (Bohemia included) and lowest among the Slavic races of Dalmatia, Galicia, and Bukowina.

Of learned societies, libraries, museums and art galleries there are a very great number, the most prominent of which are the imperial academies of science at Vienna, Prague, and Cracow. The Imperial Library at Vienna possesses 900,000 volumes and the library of the University of Vienna nearly 600,000. The periodical press increased in numbers from 2137 publications in 1894, to 2849 in 1899.

The educational system of Hungary is similar in its general outline to that of Austria, but differs from it in the greater uniformity of organization, due to the preponderating influence of the Magyar element in the population. The persistent attempt to make Magyar the exclusive language in the public schools has been a marked feature of educational policy in Hungary proper in very recent years. Attendance at the elementary schools, grammar schools, and the so-called repetition courses is compulsory for all children between the ages of 6 and 15, and it is incumbent on all communes to provide, generally with the aid of the State, adequate facilities for elementary instruction. In 1894 the number of elementary schools was 16,881, and the enrollment of pupils 2,270,584, or nearly 80 per cent. of all children of school age. In 1899 the schools had increased to 18,375. The *Gymnasia* and the *Realschulen*, which offer courses of eight years in preparation for the universities and technical schools, are supported by the communes, by the State, or partly by both. In 1894 there were 186 of these secondary schools, with a staff of 3230 instructors and 51,228 students. In 1899 the number of institutions was 214 and the attendance 61,520. At Budapest, Klausenburg, and Agram are universities supported by the State, with faculties of theology, law and political science, medicine, and philosophy, attended in 1899 by nearly 9500 students. Of these the University of Budapest is preëminently in the lead, with a faculty of 275 professors and instructors and an enrollment of about 5000 students. At Budapest is also the Royal Joseph Polytechnic Institute, with nearly 2000 students. The other technical institutions and commercial institutes of superior grade, 51 in number, impart instruction to nearly 6000 students, while the lower commercial and industrial schools are attended by more than 86,000 pupils. Between 1895 and 1899 the number of periodicals rose from 1000 to 1258, of which 71 per cent. were in the Magyar language and 12 per cent. in German.

GOVERNMENT. The Austro-Hungarian monarchy is composed of the Empire of Austria and the Kingdom of Hungary, and though it is common to speak of an Austro-Hungarian empire divided into Cisleithan and Transleithan halves, it is nearer the truth to regard Austria-Hungary as a loose union of two independent States. Essentially the only bond between them is their possession of a common ruler; the crown of both is hereditary in the House of Hapsburg-Lorraine, and the Emperor of Austria is at the same time Apostolic King of Hungary. He is crowned both at Vienna and Budapest, and takes the oath before both the Austrian Parliament and the Hungarian nation in his twofold capacity. The present dual system was adopted by the *Aus-*

gleich (agreement) of 1867, when the two countries, while retaining their complete independence in domestic affairs, agreed to establish a common administration for certain matters of State. Also by this *Ausgleich* (which is a general name for several treaties dealing with different subjects adopted at about the same time) Austria and Hungary were constituted a customs union, pledged to a common commercial policy, with a common coinage and system of weights and measures, a joint bank of issue, and a uniform control of monopolies and interstate railways. The departments of State common to both countries are those of finance, war, and foreign affairs, and in the functions delegated to the last two, there is apparent a general tendency to grant as little as possible to the common administration, and to keep as much as possible for the national executive. The minister of foreign affairs is charged with the supervision of the Emperor-King's household and with the maintenance of the diplomatic and consular service. The ministry of war is concerned chiefly with the organization and training of the troops, since recruiting and the regulation of the terms of service are left to the two parliaments. The duties of the minister of finance are confined to the administration of the customs, the balancing of accounts for the two other ministries, and he is also intrusted with the government of the dependent provinces of Bosnia and Herzegovina. The proportion of the common expenses to be borne by the two countries is determined, according to the *Ausgleich*, every ten years, and in 1899 the rate was fixed at 65.6 per cent. for Austria and 34.4 per cent. for Hungary.

Practically all legislation necessary to render the work of the common departments efficacious, rests with the Austrian and Hungarian diets, but the ministries are controlled directly by two bodies known as the Delegations, representing the parliaments of the two countries. Each delegation consists of 60 members, 20 of whom are elected by the Upper House and 40 by the Lower House. The delegations assemble at Vienna and at Budapest in alternate years, and deliberate apart, communicating only in writing. If they arrive at no agreement after three interchanges, they meet as one body and vote without debate. Evidently the system of dual government is not only cumbersome, but precarious, in that it depends for its continuance on the mutual good-will of two contracting parties, each of whom keeps a jealous watch against the least ascendency on the part of the other. The activity of the common ministries is dependent on concurrent legislation by the Austrian and Hungarian Parliaments; a refusal on the part of either to vote its proportion of the common expenses or its quota of troops may instantly paralyze the financial and defensive powers of the monarchy; and that such action is not at all improbable was shown in 1897, when that part of the *Ausgleich* establishing a customs union failed of renewal, and was replaced by a reciprocity treaty for a term of ten years.

The Austrian Empire, independently of Hungary, comprises the seventeen crown-lands represented in the Reichsrat at Vienna. Of these territorial divisions, diverse in race, language, and history, some, like Bohemia, Galicia, and Dalmatia, are kingdoms of which the Austrian Emperor is King; some, like Styria, Carniola, and the two Austrias, are duchies or archduchies; the rest are variously designated principalities. As a result of this combination of sectionalism, based on ethnographical distinctions, with the personal rule of one man, the Empire partakes at the same time of the character of a federal State and of a centralized monarchy. The element of racial diversity influences also the relations between the Crown and the legislative bodies. Parliamentary government, in spite of presenting practically all the outward forms it bears in England, for instance, has not attained to anything like full development, for the reason that the various parties in the Diet have not as yet been able to unite permanently either in supporting or opposing the Crown. By playing off the different factions against each other, the Emperor has succeeded in retaining the balance of power, and in making the ministers his servants, though in law they are responsible to the Parliament. At the same time, such incidents as the blocking of all legislation for months at a time—a thing which happens frequently in the strife of parties—afford him an opportunity for exercising his extra-constitutional powers in the matter of promulgating ordinances and decrees.

The constitution of Cisleithania is based, among other statutes, on the Pragmatic Sanction of 1713, on the patents of 1860 and 1861, and chiefly on the Fundamental Law of December 21, 1867. It may be suspended at any time by a two-thirds vote of both houses of the Reichsrat. The Emperor is the source of law and justice; he legislates concurrently with the Reichsrat for Cisleithania and with the provincial diets (*Landtage*) for the provinces. He has the power to make treaties, issue ordinances, grant pardons, appoint officials, and to summon, prorogue, and dissolve the legislatures. Through his ministers he may initiate legislation. In case of necessity he may suspend the constitution and legislate provisionally by ordinance. Every act of his, however, must be countersigned by a minister, and his extra-constitutional decrees must be countersigned by the entire Ministerial Council.

The Reichsrat consists of a House of Lords (*Herrenhaus*) and a House of Representatives (*Abgeordnetenhaus*). The Upper House was made up in 1901 of 17 members of the Imperial family, 66 persons holding their seats by hereditary right, 6 archbishops and 8 bishops of princely rank, and 139 life-members. The Lower House consists of 425 members, chosen as follows: 85 by the great landed proprietors, 118 by the towns, 129 by the rural communities, 21 by the Chambers of Commerce, and 72 by the whole male population above the age of twenty-four, exclusive of domestic servants. The different classes of electors are representative, in a way, of the ancient estates. The qualification for the franchise, in all classes except the last, is the payment of a direct tax, which varies from a very considerable sum, in the case of the landed proprietors, to a trifling amount in the town and rural communities. The representatives are selected directly in all classes, save the rural communities. The electoral districts are not marked out on the basis of population alone. Ethnical and economic conditions, and to a great degree the historical importance of different provinces, are taken into consideration. The representation of the different provinces in the Lower House of the Reichsrat is as follows: Lower Austria, 46; Upper

Austria, 20; Bohemia, 110; Bukowina, 11; Carinthia, 10; Carniola, 11; Dalmatia, 11; Galicia, 78; Görz and Gradisca, 5; Istria, 5; Moravia, 43; Salzburg, 6; Silesia, 12; Styria, 27; Trieste, 5; Tyrol, 21; Vorarlberg, 4.

The Reichsrat assembles annually. The consent of both houses is necessary to all treaties relating to commerce or necessitating the imposition of taxes as well as to all statutes and appropriations. Bills may originate in either house, but the annual budget and the recruiting bill fixing the quota of troops for the year must be presented to the Lower House first. Concerning the position of the Reichsrat in respect to the executive, something has been said above; its relation to the provincial diets may be summed up in the statement that the latter are vested with the power of legislation on all subjects not reserved to the Reichsrat, and that the matters so reserved are very numerous, including any interest that may concern two or more provinces in common. In greater detail, the scope of the Reichsrat includes, in addition to those mentioned, the subjects of customs, coinage and communications, banking, corporations and trade, citizenship, domicile and census, religion and the right of association, the press and copyright, the general policy of public instruction, judicial legislation, the organization of the executive and judicial departments.

The administrative work of the General Government is divided into eight departments, comprising the ministries of the Interior, Finance, Defense, Agriculture, Railways, Justice, Commerce, Instruction and Worship. The heads of the eight departments, together with two ministers without portfolio representing the kingdoms of Bohemia and Galicia, constitute the Ministerial Council. The civil service in Austria is characterized by its freedom from politics, elaborate automatism, and its marked tendency to intrude on the private life of the citizen. Though the Austrian constitution embodies a comprehensive bill of rights, acts which in their nature are serious limitations of the rights of the citizen are frequently justified as being embraced within the legitimate exercise of the police power. The constitutional restraints on the freedom of speech and of the press, and the right of association, are considerable, and as their interpretation is left largely to executive officials, they often become quite onerous.

Provincial Diets and Local Government. The provincial diets of Cisleithania are in many cases the ancient assemblies, established in the different provinces before they were brought under one rule; the diets, therefore, are the rallying-grounds of national parties, and in a way, the internal political condition of Austria is affected as much by the attitude of the various provincial legislatures toward the general problems of government as by the relations of parties in the Reichsrat. The diets are unicameral, and comprise (1) the archbishops and bishops of the Catholic Church and the rectors of the universities within the crown-land, and (2) the representatives of landed proprietors and the Chambers of Commerce, and the members elected by the rural communities and the towns. The size of the diets varies from 242 members in Bohemia to 21 members in Vorarlberg. The president of the assembly is appointed by the Emperor, who through this officer, as well as through the exercise of the right of prorogation and dissolution, exerts very considerable influence on the legislative bodies. The authority of the provincial assembly extends to questions of local government and local taxation, agriculture and public works, the control of the territorial domains, and the management of secondary schools and charitable institutions. The executive power is vested in a committee (*Landes-Ausschuss*), consisting of a president appointed by the Emperor, and a certain number of members elected by the Diet.

For administrative purposes, every province constitutes a department (*Landesregierung*) under a governor (*Statthalter* or *Landes-Präsident*) appointed by the Emperor. The *Landesregierung* is subdivided into districts (*Bezirkshauptmannschaften*) and communes (*Gemeinden*). The police, as well as the civil power, is vested in the governor. He presides over the boards of education and of health, and controls directly the magistrates of the towns and the heads (*Bezirkhauptmänner*) of the districts. There is no uniform municipal code in Austria, each provincial diet having the power to model the municipal government after its own fashion. But within each province there is perfect uniformity of administration except for some of the largest cities, such as Vienna, Prague, etc., which are governed by special charters. The common features of all the municipalities in Austria include a *Gemeindeausschuss*, or municipal council, elected generally for a period of three years by the members of the commune, and a *Gemeindevorstand*, or executive board, elected by the council. This board consists of a small number of men under the presidency of the burgomaster, and carries out the decisions of the council.

Justice is administered in the first place by 939 district courts, which try minor offenses and misdemeanors, and hold prisoners for the higher tribunals. For the trial of more serious charges, there are 72 provincial and circuit courts of original jurisdiction. Cases involving severe penalties, or concerned with political and press offenses, are brought before the jury courts. Appeals are taken to the higher provincial courts, 9 in number. The court of last resort is the Supreme Court of Justice and Cassation at Vienna. There are also numerous courts for the trial of special matters, such as commercial, revenue, and military cases. The Court of the Empire at Vienna decides questions of jurisdiction and cases involving conflict of laws. Before the High Court of Administration are brought all controversies between private citizens and public officials.

The *Kingdom of Hungary* comprises Hungary proper, with Transylvania and the crown-lands of Croatia-Slavonia. The constitution of the Kingdom is based on a series of statutes beginning with the Golden Bull of 1222, the charter of Hungarian liberties. The fundamental law of June 8, 1867, confirmed the sweeping reforms which the Revolutionists of 1848 had effected in abolishing old feudal privileges, extending the suffrage, and reconstructing institutions on a modern basis. Subsequent legislation has modified the constitution only in matters of detail and procedure. The King is bound by the same constitutional limitations as in his Austrian dominions; but, by reason of the greater homogeneity of the Lower House of the Hungarian Parliament, does not exercise so great an influence in its deliberations as over those of the Austrian Reichsrat. As in Austria, decrees must be countersigned by a responsible minister to acquire validity. The Hungarian Parliament is composed of an Upper House—the Table of Magnates—and a Lower House—the House of Representatives. The Table of Magnates in 1900 consisted of 17 members of the royal family, 42 archbishops, bishops, and other dignitaries of the Catholic and Greek churches, 12 representatives of the Protestant churches, 225 hereditary peers, 76 life-peers, 17 high officers of State, holding their seats *ex officio*, and 3 delegates from Croatia-Slavonia. The House of Representatives, which is chosen by the entire male population over the age of twenty, the qualifications being the payment of a small direct tax or the possession of a certain income, contains 453 members (413 from Hungary and 40 from Croatia-Slavonia), elected for a period of five years. In the Parliamentary scheme, the Table of Magnates plays an important part. The majority of its members are great landowners, possessing extensive influence in the country, and as such often enter into opposition to the popular chamber. In the Parliament as a whole, the Magyar element is strongly predominant, and of the Magyars it is the gentry, or minor nobility, that make up the bulk of the House of Representatives and are the controlling political power of the country. The establishment of the Magyar supremacy has been steadfastly pursued in all walks of public life, and the Magyar language is the only recognized language in the courts and schools of Hungary proper, the army, etc. Although the other races combined outnumber the Magyars by 4,000,000 out of a total population of 19,000,000, the only race that has received recognition from the Magyars is the Slavic race of Croatia-Slavonia. The Hungarian Parliament legislates for Hungary and for all affairs that are common to Hungary and Croatia-Slavonia. For purposes of local legislation—i.e. for such matters as agriculture, education, police, and many features of civil and criminal law—Croatia-Slavonia has a diet of its own, consisting of 7 ecclesiastical dignitaries, 26 peers and officers of State, and 90 representatives of the rural communities and towns.

The executive power in the Kingdom of Hungary is vested in a cabinet consisting of 9 ministers and a minister-president. The 9 ministers are those of (1) Finance, (2) Interior, (3) Agriculture, (4) Industry and Commerce, (5) Defense, (6) Justice, (7) Education and Public Worship, (8) Minister for Croatia-Slavonia, (9) Minister *ad latus*—i.e. near the person of the King. The ministers are responsible to Parliament. The chief executive in Croatia-Slavonia is the *Ban*, who stands under the control of the Hungarian ministers. Hungary proper (including Transylvania) is divided into 63 counties, at the head of each of which is a governor (German *Obergespan*), and 25 independent municipalities, the latter comprising the free royal cities. The counties are subdivided into 106 incorporated towns, governed by magistrates, and 410 presidencies (*Stuhlrichterämter*), and the presidencies are further portioned out into greater and smaller communes. In these ultimate units the representative body is composed, half of deputies, elected by all males over the age of twenty, paying a small tax, and half of the highest taxpayers in the communes. The executive power rests with a council appointed for varying terms in the rural and town communes. The presidencies have no legislatures, but are mere administrative divisions.

Local Government. The legislative bodies in the counties are elected by the qualified parliamentary electors of the district, and the *Obergespan* is assisted in his duties by a committee or council appointed for a period of ten years. In the degree of self-government the municipalities rank with the counties. Their representative bodies are created in the same manner as those of the communes, and they have their councils and magistrates. Croatia-Slavonia contains 8 counties and 12 free cities. The counties are subdivided into communes, rural and urban, similar in their government to those of Hungary. The county legislatures are composed of representatives chosen by the body of parliamentary electors, of committees representing the municipalities and communes, and of the higher county officials.

Justice. In Hungary the tribunals exercising original jurisdiction comprise 457 district courts for the trial of misdemeanors, 76 circuit courts for the hearing of criminal charges and important civil cases, and 15 jury courts for the trial of press offenses. Appeals from the lower courts rest with the 12 Royal Tables of Justice, and in the final instance with the Royal Curia at Budapest, in Hungary, and the Supreme Court of Justice and Cassation at Agram, in Croatia-Slavonia. There are besides a tribunal of Commerce and Exchange at Budapest, a Court of Admiralty at Fiume, a Central Court of Land Registry, and a Supreme Court of Discipline for military cases.

Finance. An extremely heavy public debt, whose origin dates back a century and a half, and which not only shows no signs of abatement, but keeps growing from year to year; a chronic deficit in the Imperial budget; a burdensome system of taxation, which falls heaviest on the shoulders of the poorer classes of the population—such is the cheerless aspect of the national finances of the country. The following figures show the budgets of Austria and Hungary during the last quarter of the century:

Year	Austria		Hungary	
	Revenue	Expenditure	Revenue	Expenditure
1875	$159,056,000	$159,056,000	*	
1885	212,978,000	214,960,000	$146,206,000	$146,211,000
1895	308,375,000	301,930,000	215,631,000	204,832,000
1901	333,326,000	333,156,000	214,486,000	214,481,000

* Deficit of $20,000,000.

The per capita expenditure increased in Austria from $7.92 in 1880 to $9.58 in 1890, and to $12.76 in 1901; while in Hungary it was $7.49, $9, and $11.53, respectively. Nearly 40 per cent. of the total expenditure of the monarchy is absorbed by the service of the debt; 18 per cent. of Austria's expenditure and 7 per cent. of Hungary's go to the common expenditure of the monarchy, i.e. for the ministry of foreign affairs, consular services, army and navy, etc.; and about 40 per cent. of the expenditure of either country goes to general administrative expenses, including clerical service in all departments, maintenance of schools and teachers, churches and clergy, police, *gendarmerie*, etc. The chief source of revenue is taxation, which furnishes 88 per cent. of all the income of Austria, and 70 per cent. of the revenue of Hungary; and in both countries the indirect taxes, i.e. those falling heaviest on the consumers, especially the poorer classes, constitute the most important item of taxation, yielding more than 60 per cent. of the entire revenue in Austria and over 40 per cent. in Hungary. The direct taxes yield 28 per cent. of the revenue of Austria and 30 per cent. of Hungary, and the income tax goes to make up about one-fourth of the direct taxes. Finally, a more important source of revenue than in most other countries are the Government monopolies and undertakings, railways, telegraphs, post-office, tobacco, forests, mines, lottery, etc., which furnish as much as 30 per cent. of all the revenue of Hungary and about 8 per cent. of that of Austria.

The public debt of Austria-Hungary is extremely large. Fully 40 per cent. of the total expenditure of the monarchy goes toward paying interest and a slight part of the principal of the debt. By the agreement of 1867, the separate debts of the two countries were consolidated into a common debt of the monarchy. In 1899 this common debt still amounted to more than $1,102,000,000. Since 1868 the new debts contracted by the two countries have been kept distinct, and interest paid out of the separate revenues of Austria and Hungary. While the common debt has been somewhat decreased, although very slowly, the separate debts have gone on increasing from year to year, until now they have grown to tremendous proportions, proving a great drain on the resources of the people. In 1887 the total indebtedness of the monarchy exceeded $2,114,000,000; in 1897 it had increased to $2,723,000,000. Of this great total $26,000,000 represented the floating debt of the monarchy, consisting mostly of paper money; $1,090,000,000 was the amount of the joint consolidated interest-bearing debt of the monarchy; $597,935,000 represented the special Austrian debt, and $1,006,000,000 the special Hungarian debt. It should be noted in conclusion that a great part of that debt has been incurred for the purchase or construction of profitable undertakings, such as railways, telegraphs, mines, etc.

Army and Navy. Military service is obligatory on all citizens in Austria and in Hungary. The military system is organized on identical lines in both halves of the monarchy, and the common army is under the head of the common ministry of war. Austria and Hungary have their own national guards (the *Landwehr* in one, the *Honvédség* in the other) and the general levy (*Landsturm*, *Népfölkelés*) of the nation. The common army and the special armies are reinforced by a supplementary reserve (*Ersatzreserve*, *Póttartalék*). The terms of service are, for the common army, 12 years, of which 3 years are spent in the line, 7 years in the reserve, and 2 years in the *Landwehr;* for the special armies, 12 years likewise, of which 2 or 3 years are passed in the line and 9 or 10 years in the *Landsturm*. All citizens between the ages of 19 and 42 who do not serve in the common army, the national guards, the supplementary reserve, or the navy, belong to the *Landsturm*, or general levy. Persons possessing certain educational qualifications are subject to only one year's active service in the military forces. The Austro-Hungarian navy is maintained chiefly for purposes of coast defense. See articles Armies; Navies.

Weights, Measures, and Money. The metric system is in vogue throughout the monarchy. The monetary system is on the gold basis. A crown (*Krone*)—equal to one-half of the old gulden or florin—is worth 20.3 cents United States money. A crown has 100 *Heller*, the heller being equal to one-half kreuzer, the coin formerly in vogue.

Population. The growth of population during the last half of the Nineteenth Century was as follows:

YEAR	AUSTRIA	HUNGARY	TOTAL
1850	17,534,950	13,191,533	30,726,483
1857	18,224,500	13,768,513	31,993,013
1869	20,394,980	15,509,455	35,904,435
1880	22,144,244	15,695,184	37,839,428
1890	23,895,413	17,463,791	41,359,204
1900	26,197,304	19,203,531	45,400,835

(For figures of population and its density by crown-lands, see first table of this article.)

At the close of the Nineteenth Century there were but three cities in Austria-Hungary having a population of over 200,000: Vienna (1,674,957), Budapest (732,322), and Prague (201,589). The following are the most important towns of Cisleithania: Vienna, Prague, Lemberg, Gratz, Trieste, Brünn, Cracow, Pilsen, Czernowitz, Linz, Pola, Budweis, Laibach, Salzburg, Zara, Innsbruck, Troppau, Klagenfurt, and Olmütz. The principal towns of Transleithania are: Budapest, Szegedin, Maria-Theresiopel (Szábadka), Debreczin, Prèsburg, Hódmező-Vásárhely, Agram, Kecskemét, Arad, Temesvár, Groszwardein, Klausenburg, Fünfkirchen, Fiume, and Kaschau.

Birth and Death Rates. Both show the same tendency to decrease that is so prevalent throughout the civilized world, the former due to increased uncertainty of occupation and greater willingness on the part of the population to check births, and the latter due to improved sanitation and higher standards of living. In 1898 the death-rate in Austria was 24.76 per thousand, as compared with 29.22 in 1888, the birth-rate in the same years being 35.97 and 37.62, thus leaving an excess of new-born over deceased equal to 11.20 per thousand in 1898, as against but 8.60 in 1888. In Hungary the death-rate per thousand was 33.4 in 1891, and 28.5 in 1897, while the birth-rate decreased from 42.6 in 1891, to 40.3 in 1897, the excess of births over deaths thus having increased from 9.2 in 1891 to 11.8 in 1897. In 1890 there were 19,264 blind people in Austria and 18,363 in Hungary—a rather high proportion for the latter country, considering its smaller share of the population of the monarchy. The respective numbers of deaf mutes in the two halves of the monarchy were 30,876 and 19,024; insane, 36,151 and 10,536.

Emigration and Immigration. In the twenty-year period of 1878-1898 about 900,000 people emigrated from Austria-Hungary to North and

South America, of which 818,310 went to North America, 41,210 to Brazil, and 25,000 to Argentina. According to the report of the United States Commissioner-General of Immigration, the number of immigrants coming to the United States from Austria-Hungary increased from 62,491 in 1898-99 to 114,847 in 1899-1900, the most numerous nationalities in order of importance in the latter year being Slovaks (29,000), Poles (22,000), Croatians and Slavonians (17,000), Jews (17,000), Hungarians (14,000), Germans (7000), and Czechs or Bohemians (3000). Immigration is very small, and principally comes from Germany, Rumania, and Servia.

NATIONALITIES. The population of Austria-Hungary embraces a greater number of races, distinct in origin and language, than that of any other European country except Russia. The Slavs are the most numerous race, amounting to over 46 per cent. of the whole population. Next in order come the Germans, then the Magyars, while the Wallachs (Rumans) occupy the fourth place. The Slavs form the bulk of the population of Bohemia, Moravia, Galicia, Carniola, Dalmatia, Croatia, Slavonia, and the north of Hungary. The Slavs are split up into a number of nationalities, differing greatly in language, religion, culture, and manners; so that their seeming preponderance in the monarchy is lost. These nationalities include the Czechs (the most numerous of all) in Bohemia and Moravia, the Poles in Galicia, the Ruthenians in Galicia and Northern Hungary, the Croats and Serbs in Croatia and Slavonia, the Slovaks mainly in northwestern Hungary, the Slovens in Carniola, Styria, etc., the Morlaks in Dalmatia, and some Bulgarians. The Slavs constitute more than half of the population of Cisleithania. The Germans number only about 25 per cent. of the total population. They are dispersed over the monarchy, predominating numerically in Upper and Lower Austria, Salzburg, Tyrol, Styria and Carinthia. The Magyars, or Hungarians proper, constitute only about one-sixth of the population of the monarchy, and less than 43 per cent. of that of the Kingdom of Hungary. One-seventh of the population of Transleithania consists of Rumans, who constitute the bulk of the people of Transylvania. The Rumans are also numerous in Bukowina. The other Romanic peoples of Austria-Hungary are the Italians, inhabiting the south of Tyrol, Istria, Trieste, and Dalmatia; the Ladins (Latins), occupying some valleys in Tyrol; and the Friauls about Görtz, north of Triest. The number of Jews in the monarchy is not far from 2,000,000, which is about one-fifth of the total Jewish population of the globe. The Gypsies are estimated to number about 100,000. There are more than 10,000 Armenians scattered over the eastern half of the monarchy.

As to religion, the great bulk of the nation is Roman Catholic. By the census of 1890 there were 27,754,000 Roman Catholics; of Greeks and Armenians in union with the Church of Rome, 4,485,000; of Orthodox Greeks, 3,178,000. The Protestants of all denominations numbered 3,933,000; and of Israelites there were 1,868,000. The monarchy is divided into archbishoprics, bishoprics, Protestant superintendencies, and parishes. The statutes regulating the relations of State and Church insure the sovereign certain rights arising from the dignity of his office, but the law insures religious liberty and the independence of the Church from the State. There is no religious test as a qualification for the possession of civil and political rights, and liberty of conscience is secure. The religious bodies have a legal right to manage their own affairs and to possess funds, estates, or endowments for the purposes of worship, instruction, or charity. But they must first secure their legal recognition from the minister of ecclesiastical affairs, which is granted to all sects whose doctrines and practices are not inimical to the laws of the State.

HISTORY.

The nucleus of the dual monarchy was that part of the archduchy of Austria that lies below the Enns. In the earliest times, what is now the archduchy of Austria was inhabited by the Taurisci, a Celtic people, subsequently replaced by the Norici. After the conquest of the Norici by the Romans (B.C. 14), the country to the north of the Danube belonged to the Marcomanni. On the south of the river lay the Roman provinces of Noricum and Pannonia, in the latter of which was the municipal city of Vindobona (Vienna). Tyrol formed part of Rhætia. All these boundaries were swept away by the irruption of the northern peoples, and the regions in question were occupied in succession, during the Fifth and Sixth centuries, by the Boii, Vandals, Goths, Huns, Longobards, and Avars. After the Longobards had settled in Italy, the Enns came, about 568, to be the boundary between the tribes of German origin and the Avars, a people who had come from the East. The Avars in 788 crossed the Enns, and fell upon Bavaria, then part of the Frankish Empire; but Charlemagne drove them back (796) as far as the Raab, and brought the district from the Enns to that river under his rule. He sent colonists, mostly Bavarians, into the new province, and appointed a margrave over it. It came into the possession of the Hungarians in 900, but was reconquered by Otho I. in 955, and reunited with the German realm.

About 976 the Emperor Otho II. appointed Leopold of Babenberg margrave of the reconquered province, and his dynasty ruled this frontier region of the Holy Roman Empire for about 270 years. Their possession came to be known as Oesterreich, or Eastern Realm, a name Latinized into Austria. Under Henry Jasomirgott (1141-77) the Mark above the Enns was annexed to the lower Mark, the enlarged province raised to a duchy, and important privileges were conferred on the new duke and his heirs. Duke Henry removed his capital from the Leopoldsberg to Vienna. He beautified the city, and began the building of the cathedral of Saint Stephen. Under his successors Styria was united with Austria. Under Leopold VI., the Illustrious (1198-1230), the Austrian realm reached a high stage of prosperity. The Babenberg line became extinct with his successor, Frederick, who fell in battle with the Magyars (1246). An interregnum ensued. The Emperor Frederick II. treated the duchy as a lapsed fief of the Empire, but claims to its possession were set up while the Empire was distracted by the contests between rival emperors. The States of Austria chose Ottokar, King of Bohemia, as duke in 1251, and in 1260 this powerful monarch made himself master of Styria. He subsequently came by inheritance into possession of Carinthia. Ottokar refused to acknowledge Rudolph of Hapsburg as Emperor, and a war ensued in which he was vanquished. He was compelled to give up Austria, Styria, and Carinthia to Rudolph. The struggle was soon renewed, and Ottokar lost his life in the battle on the Marchfeld (1278). Shortly afterwards the Emperor (1282) conferred the duchies of Austria, Styria, and Carinthia on his sons, Albert and Rudolph.

Fostered by the Hapsburg family policy, which was maintained for centuries without regard to its effect upon Germany, the power of Austria and the Hapsburgs grew together. Albert, while attempting to subdue the rebellious Swiss, was murdered near Rheinfelden (1308) by his nephew, John of Swabia, whom he had deprived of his hereditary possessions. Frederick the Handsome, one of his five sons, was chosen (1314) by a party to the Imperial throne, but the election was contested, and he was defeated (1322) by his rival, Louis of Bavaria. The House of Hapsburg was already so powerful that it excited the jealousy of the German princes. Another of the sons of Albert, Leopold, was defeated at Morgarten (1315) in his attempt to reduce the Swiss cantons which had thrown off their allegiance under Albert I. At last, on the death of all his brothers, Albert II. reunited the Austrian possessions. After his death (1358), two sons, Rudolph and Albert III., successively followed in the duchy of Austria. Another son, Leopold, held the other lands, but lost his life at Sempach (1386), in seeking to regain the Hapsburg possessions in Switzerland. From Albert and Leopold were derived the two ducal lines of Austria and Styria (the latter afterwards subdivided into the lines of Styria and Tyrol). During Albert III.'s reign, Tyrol and other districts were acquired by Austria. After his death (1395), the dukedom was held by his son, Albert IV. Albert V., who succeeded his father in 1404, and who married the daughter of the Emperor Sigismund, was chosen successor to that monarch in Hungary and Bohemia, and was at the same time raised to the dignity of Holy Roman Emperor, as Albert II. (1438). The Imperial dignity was henceforth uninterruptedly held by the Hapsburgs, with the exception of one brief interval, down to the end of the Holy Roman Empire in 1806. With Ladislas, Albert's son, the Austrian line of the house became extinct (1457), and its possessions went to the Styrian line. To this line belonged the Emperor Frederick III., who made Austria an archduchy, of which he came into full possession after the death of Ladislas and of his own brother, Albert, in 1463.

In 1477 his son, Maxmilian I., married Mary of Burgundy, daughter of Charles the Bold, and thus acquired the opulent provinces of the Netherlands. Becoming Emperor on the death of his father (1493), he gave the government of the Netherlands to his son Philip. Tyrol now fell again to the chief branch of the House of Austria, and several districts were acquired from Bavaria. The court of Vienna became an important centre of German art and science. The marriage of the Emperor's son, Philip, with Joanna of Spain placed the House of Hapsburg on the throne of Spain and the Indies. Philip died in 1506; and on the death of Maximilian I., in 1519, Philip's son, Charles I. of Spain, more powerful by his hereditary possessions than any other monarch in Europe, was elected German Emperor as Charles V. On account of his large interests outside of Germany, Charles was required by the electors to sign an agreement (*Wahlkapitulation*) to the effect that he would not further the interests of Spain at the expense of the Empire; and this practice was continued with his successors. In 1521 Charles relinquished the sole sovereignty over the bulk of the old hereditary possessions of the House of Austria to his brother, Ferdinand (originally joint possessor with him), the founder of the Austrian branch of the House of Hapsburg, as distinguished from the Spanish. In 1556 Charles V. abdicated the Imperial throne of Germany, and was succeeded by Ferdinand I. Ferdinand had married the sister of Louis II. of Hungary and Bohemia, and after the death of that king on the field of Mohács, where the Turks laid low the power of Hungary, in 1526, Ferdinand was chosen to succeed him in Bohemia, and was also elected king by a part of the nobles in Hungary. John Zápolya, Waywode of Transylvania, was chosen King of Hungary by the National party, and was supported by Sultan Solyman the Magnificent, who established the Turkish sway over a great part of Hungary, and whose forces laid siege to Vienna in 1529. After contests extending over twenty years, Ferdinand was allowed to retain possession of Upper Hungary on condition of paying an annual tribute to the Sultan. The catastrophe of Mohács may be said to have given birth to the peculiar political organism now known as the Austro-Hungarian monarchy, with such discordant elements as Germans, Magyars, and Slavs united under the sway of a single dynasty. The Bohemian realm in the time of Ferdinand I. included (besides Bohemia) Moravia, Silesia, and Lusatia. On the death of Ferdinand I., in 1564, his eldest son, Maximilian II., received the Imperial crown, together with Austria, Hungary, and Bohemia; a second son, Ferdinand, received Tyrol; a third, Charles, obtained Styria and Carinthia. Maximilian II. was fond of peace, tolerant in religion, and a just ruler. He died in 1576, and of his five sons, the eldest, Rudolph II., who had been crowned King of Hungary and of Bohemia, succeeded him as Roman Emperor. Under him the possessions of the Archduke Ferdinand of Tyrol, who had married Philippine Welser, the beautiful daughter of an Augsburg burgher, reverted to the other two lines, Ferdinand's children not being considered noble. Rudolph II. adhered to the old feudal usages, and was an incapable sovereign, leaving everything to his ministers and the Jesuits. His war with the Porte and Transylvania brought him little credit; and the Protestants of Bohemia, oppressed by the Jesuits, extorted from him a charter of religious liberty. He died January 20, 1612, having already relinquished Hungary, the Archduchy of Austria, and Moravia, in 1608, and Bohemia, in 1611, to his brother Matthias, who succeeded him as Roman Emperor. Matthias concluded a twenty years' peace with the Turks, and had his counsin Ferdinand, son of the Archduke Charles of Styria, third son of Maximilian II., chosen King of Bohemia, Hungary, and of the Romans. Bohemia, where the religious strife kindled the Thirty Years' War in 1618, refused to acknowledge the new King, who was a fervent Catholic, and chose the Elector Palatine, Frederick V., the head of the

Protestant Union, as King. The States of Austria and the Hungarians were also refractory. Matthias died March 30, 1619, and Ferdinand II. became Roman Emperor. The battle of Prague (1620) subjected Bohemia to Ferdinand, who suppressed Protestantism there with a relentless hand. The events of the reign of Ferdinand II. will be found treated in the article on the Thirty Years' War. Bohemia's right of election of its king and its patent of religious liberty were withdrawn. The war closed (1648) under Ferdinand's son, Ferdinand III. (1637-57), a more politic prince and a better financier. At the peace of Westphalia (1648), Austria had to cede her possessions in Alsace to France. Ferdinand III.'s son and successor, Leopold I., provoked the Hungarians to rebellion by his severity. Tökölyi (q.v.) received aid from the Porte, and Kara Mustapha besieged Vienna (1683), which was rescued only by an army of Poles and Germans under John Sobieski and Charles of Lorraine, who inflicted a crushing defeat upon the Turks. In 1687 Leopold I. forced the Hungarians to make their kingdom hereditary in the Hapsburg family. Prince Eugene compelled the Porte (1699) to give up the country between the Danube and Theiss, and, in 1718, to cede other important territories to Hungary. At this time also Transylvania became a possession of the Hapsburgs. On the death of Charles II., the last of the Hapsburg sovereigns in Spain, in 1700, the Archduke Charles, second son of Leopold I., claimed the crown in opposition to Philip V., grandson of Louis XIV. This led to the war of the Spanish Succession (q.v.), during which Leopold died, May 5, 1705. He was of sluggish, phlegmatic character, and wholly under the influence of the Jesuits.

His eldest son and successor, the enlightened Joseph I., continued the war. He died childless, April 17, 1711, and was succeeded by his brother, Charles VI. The peace of Utrecht (1713) secured to Austria the Spanish Netherlands, Milan, Mantua, Naples, and Sardinia (exchanged for Sicily in 1720). A curtailment of territory, however, soon ensued. At the peace of Vienna (1735), which ended the War of the Polish Succession, Charles VI. had to give up Naples and Sicily to Don Carlos of Spain, and part of Milan to the King of Sardinia, receiving only Parma and Piacenza instead. He also lost at the peace of Belgrade (1739) a great part of the fruits of Eugene's conquests, giving back to the Porte, Belgrade and the adjoining Servian territories, as well as the parts of Wallachia and Bosnia that had belonged to Austria. The Emperor conceded all these points with a view of securing adhesion to the Pragmatic Sanction (q.v.), conferring the succession on his daughter, Maria Theresa, an object to which his whole policy for years had been directed.

With his death (October 20, 1740), the male line of the Hapsburgs was extinct, and Maria Theresa, who was married to Francis, Duke of Lorraine, assumed the government. Counter-claimants appeared, and the War of the Austrian Succession broke out. Frederick II. of Prussia took the opportunity to revive an old claim of the Hohenzollerns upon Silesia and to conquer that country. The Elector of Bavaria, who was supported by the power of France (England taking the part of Austria), assumed the title of Archduke of Austria, was crowned King of Bohemia at Linz and Prague, and elected Emperor as Charles VII. (1742). The Hungarians stood loyally by their Queen, who, however, at the peace of Breslau (1742) was forced to yield Silesia to Prussia. Frederick renewed the war in 1744 by coming to the assistance of the Emperor, whose dominions had been overrun by his enemies. Charles VII. died in January, 1745, and Maria Theresa's husband was elected Roman Emperor as Francis I. A second treaty of peace (1745) confirmed Prussia in the possession of Silesia, and at the peace of Aix-la-Chapelle (1748), Austria had to cede Parma, Piacenza, and Guastalla to Don Philip of Spain. These sacrifices secured the existence of the Austrian monarchy; but Maria Theresa was bent on recovering Silesia, and with this view entered into alliances with France, Russia, Saxony, and Sweden. This forced Prussia and England to act together. At the close of the Seven Years' War (q.v.), Prussia retained Silesia, and Austria had spent her blood and treasure in vain. At the death of Francis (1765), his son, Joseph II., became Emperor, and joint-regent with his mother, of the hereditary States. Collateral branches of the House of Austria were planted by the younger sons of Maria Theresa, the Archduke Leopold of Tuscany and the Archduke Ferdinand, who married the heiress of Este (see Modena). In the first partition of Poland (1772), Austria acquired Galicia and Lodomeria, and Bukowina was ceded by the Porte in 1777. Maria Theresa died on November 29, 1780. Her administration had been distinguished by unwonted unity and vigor, both in home and foreign relations.

Joseph II., now sole ruler, was an active reformer in the spirit of the enlightened despotism of the times, though often rash and violent in his mode of proceeding. He introduced economy into every department, mitigated the censorship of the press, granted liberties and rights to Protestants, abolished 900 convents, and revised the school system. By a protective system of duties he gave an impulse to native manufactures. But his reforming zeal and passion for uniformity in the diverse countries composing his scattered realm excited opposition; the Netherlands rose in insurrection, and other disturbances broke out, which hastened his end (1790). He was succeeded in the hereditary Hapsburg dominions, as well as in the German Empire, by his brother, Leopold II., who pacified the Netherlands and Hungary. When the progress of the French Revolution had begun to threaten the political stability of Europe, Leopold entered into an alliance with Prussia against the Republican propaganda, but he died March 1, 1792, before the war began. This was declared by his son and successor, Francis, in the same year. (See France.) By the treaty of Campo Formio (1797), Austria lost Lombardy and the Netherlands, but received most of the territory of the extinguished republic of Venice (including Venetian Istria and Dalmatia). The war with France was renewed in 1799, and ended by the peace of Lunéville (1801). In 1804, when Napoleon was proclaimed Emperor of France, Francis declared himself hereditary Emperor of Austria (under the title of Francis I.), uniting all his dominions in one empire. In 1805 Austria engaged in a fresh struggle with Napoleon, who vanquished her forces and those of Russia at Austerlitz, on

December 2. In the peace of Presburg, December 26, Francis had to give up his Venetian dominions and to cede Tyrol to Bavaria. On the establishment of the Confederation of the Rhine, at the behest of Napoleon, Francis laid down the dignity of Roman Emperor, which his family had held for nearly 500 years. In 1809 Austria once more defied the might of Napoleon, but the battle of Wagram broke her power, and, in the peace of Schönbrunn (Vienna), she had to part with a large portion of the old hereditary dominions of the Hapsburgs.

The humiliating peace of Vienna was followed (1810) by the marriage of Napoleon with the Archduchess Maria Louisa, daughter of the Emperor Francis; and in March, 1812, Napoleon and Francis entered into an alliance against Russia. This unnatural alliance ceased abruptly, when the Russian campaign of 1812 had broken the power of the French Emperor. In August, 1813, Austria joined the anti-Napoleonic coalition of England, Russia, Prussia, and Sweden. Francis I. took an active part, and Austria obtained full indemnity for her losses at the close of the war. In the remodeling of the map of Europe that took place at the Congress of Vienna (1815), Austria was reinstated in the possession of Lombardy, the Venetian territories, Tyrol, and the territories wrested from her by Napoleon in 1809. Belgium was constituted part of the Kingdom of the Netherlands. The Italian possessions of Austria were now constituted into the so-called Lombardo-Venetian kingdom. Ferdinand, the Emperor's uncle, was restored to the Granch Duchy of Tuscany, of which he had been dispossessed by Napoleon.

During the period of the Restoration, and until the Revolution of 1848, Austria, her course guided by the subtle and reactionary statesmanship of Prince Metternich, exercised a powerful influence in European affairs. The Holy Roman Empire had ceased to be even a name, but the presidency of the reorganized German Confederation had fallen to Austria, and her policy toward the Germanic States was that of 'divide and rule.' Austria, Russia, and Prussia were drawn closely together in the Holy Alliance, skillfully used by Metternich to further his schemes. Every constitutional movement was stifled, and every aspiration toward nationality by the peoples composing the heterogeneous Austrian domains was rigidly repressed. But under this superficial calm, the internal condition of the Empire was approaching a crisis. The bureaucratic system of Government and police supervision produced only irritation and discontent. The strife of nationalities became keener, but the policy of playing these nationalities off against one another no longer succeeded. The Polish insurrection, which led to the incorporation of Cracow with the monarchy (November, 1846), had turned into a frightful rising of the peasantry in Galicia against the nobles. This enabled the Government to overpower the political rising, but its success only hastened the crisis. In the meantime, the opposition to Austrian rule in Italy and Hungary was becoming uncontrollable, while discontent was rife among the Slavs of Bohemia, and even the States of Lower Austria insisted on some share in the management of the realm. Francis I. had been succeeded in 1835 by his son, Ferdinand I., but there was no change of policy. The revolutionary movement was already in full swing in Italy, when the fall of Louis Philippe shook Europe to its foundation (February, 1848). A host of petitions and addresses was followed, March 13, by a popular movement in Vienna, to which the Government and military, after a feeble resistance, succumbed. Metternich resigned; the right of citizens to bear arms, and the freedom of the press were granted; and the Emperor promised to convoke a consultative assembly from all parts of the Empire. At the same time, the opposition in Hungary had carried their demand for an independent and responsible ministry, and the Emperor was not in a position to withstand it. On March 18 the insurrection broke out at Milan, and Radetzky, the military commander, was forced to retire on Verona. Venice rose and drove out the Austrians. At the same time, in Vienna, the power passed into the hands of the National Guards and the Students' Legion, the court finding it necessary to take refuge at Innsbrück. An insurrection broke out in Prague, which was repressed with bloody severity by Prince Windischgrätz (June).

The power of Austria began to recover first in Italy. Radetzky had been reduced to maintaining a defensive position at Verona, against Charles Albert of Sardinia, who had declared war on Austria at the outbreak of the revolution, and was aided by forces from Tuscany, Rome, and Naples. Negotiations had been entered into, under the mediation of Great Britain, offering the Lombards independence on moderate conditions. But in June, Radetzky took up the offensive, reduced in succession Vicenza, Padua, and other cities, and then turning against the chief Sardinian force, defeated it at Custozza (July 25) and drove it from the field. The fruits of the victory were the dissolution of Charles Albert's army, and a truce which again delivered Lombardy to Austria.

In the meantime, the Government at Vienna was more powerless than ever. The Emperor remained at Innsbrück, and the Constituent Diet was opened, July 22, by the Archduke John as his representative. But a new crisis was impending in Hungary. The opposition carried on by the Croats under their *Ban*, Jellachich (q.v.), to Magyar domination, produced a conflict of nationalities which the Imperial Government was able to use in the traditional Hapsburg way. On September 28 the Imperial Commissioner, Count Lamberg, who was sent by the Emperor to dissolve the Hungarian National Assembly, was murdered at Budapest. The Assembly continued its sittings, and appointed Kossuth president of the committee of defense. The advance of Jellachich, who had been made Imperial commander in Hungary, upon Budapest, was successfully met by the Hungarians. On October 6 a bloody insurrection broke out in Vienna. The arsenal was stormed and the war minister, Latour, murdered; the court fled to Olmütz, a committee of safety was appointed, the armed populace organized, while the Diet wavered between loyalty and revolution. In the meantime, the military forces had withdrawn from the capital, and joined Jellachich, in order to meet the Hungarians, who were advancing to the aid of the Viennese. Windischgrätz now approached with an army, and declared Vienna in a state of siege. The attack began on October 23, and after a resistance of eight days, the city was taken by storm. A number of revolutionary leaders were condemned and shot. The Diet met at Kremsir, in Moravia, and a new ministry was formed, headed by Prince Schwarzenberg. But the vigorous policy thought to be necessary for the restoration of order, and advocated by the Archduchess Sophia (mother of Francis Joseph) was foreign to the easy nature of Ferdinand I. The Emperor abdicated, December 2, and his brother, the Archduke Francis Charles, renounced his claims to the throne in favor of his son, Francis Joseph (q.v.), who was declared Emperor. The Diet, proving intractable, was dissolved in March, 1849, and a constitution was granted providing for two elective chambers and a responsible ministry. The monarchy was reconstituted into a unified realm and the national autonomy of Hungary abrogated. At the same time, in the German National Parliament at Frankfort, Austria opposed the project of a confederated State or an Empire under the leadership of Prussia. In Italy, on March 23, 1849, Radetzky inflicted upon Sardinia the decisive defeat of Novara, which was followed by the abdication of Charles Albert. The struggle in Italy was terminated in the following August by the surrender of Venice to the Austrians after a long siege.

During the winter of 1848-49 the Hungarians had been gathering strength beyond the Theiss to meet the attack of Windischgrätz, who had entered Hungary in December, and whose advance had compelled the Hungarians to evacuate Budapest in January. On the opening of the spring campaign they took the offensive, and were at first successful. Windischgrätz was succeeded in command by Welden, but the Imperial cause was not improved. The Diet at Debreczin proclaimed Hungary a republic, with Kossuth as governor; but Russian assistance at last enabled the Austrians to turn the tide, in spite of the gallant efforts of the Hungarian forces. Kossuth resigned the civil and military power into the hands of Görgei, who laid down his arms to the Russians at Világos (August 13, 1849). The surrender of Komorn, in September, completed the subjugation of Hungary, which was treated as a conquered country, and the captured patriots were dealt with by Haynau, who had succeeded Welden, with bloodthirsty rigor.

This completed the subjugation of the nationalities, and the spirit of the restoration soon showed itself. One important fruit of the revolution was retained—the abolition of feudalism. All other liberal concessions very soon disappeared. For a time the forms of the constitution of March, 1849, were retained; but the rigorous military government, and the surveillance exercised over the press, showed the real spirit of the new régime. Ultramontane influences were rampant. Finally, January 1, 1852, it was announced that the constitution and the fundamental rights were abolished, trial by jury set aside, and the old press law revived. This was followed by still greater concessions to the clergy. For ten years Austria persisted in her policy of reaction, undeterred by its paralyzing effect on the economic life of the nation or by the signs of impending revolution.

When the Eastern war broke out (1853-56), Austria's peculiar relations to Russia led her, in spite of her desire to preserve the integrity of the Ottoman Empire, to remain neutral during the contest; but it was an armed neutrality, which silently warned Russia against aggressions on the Danube.

The unceasing movements in Germany and Italy toward national unity finally forced Austria out of her unyielding attitude. The Government of Austria in Lombardy and Venetia was far from satisfactory. By means of secret treaties Austria obtained a predominant influence in Parma, Tuscany, Modena, the States of the Church, and in the kingdom of the Two Sicilies. That influence was exercised in the interests of despotism, and in opposition to the welfare of the people, whose wishes their rulers, backed by Austrian troops, were enabled to set at defiance. The question of Austria's position in Italy was brought by Cavour before the European Congress at Paris in 1856, but nothing direct resulted from the discussions. Sardinia, after all remonstrances of a peaceful kind had failed, began to arm. Austria demanded her immediate disarmament, on pain of war; but Sardinia, whose army was swelled with volunteers from every part of the peninsula, and who had previously entered into a treaty, offensive and defensive, with France, refused. Austria accordingly commenced hostilities by crossing the Ticino on April 29, 1859. On May 3, France, as the ally of Sardinia, formally declared war against Austria; but, in anticipation of what was to follow, she had several days before dispatched troops into Piedmont. The Austrian army was overthrown at Magenta, June 4, and Solferino, June 24. On July 11, Francis Joseph and Napoleon met at Villafranca and agreed on terms of peace, the chief condition of which was the cession of Lombardy to Sardinia. (See Italy.) Immediately after this war, the Emperor Francis Joseph began to turn toward schemes of a more liberal internal policy. The constitutional régime inaugurated in 1861 failed, however, to be acceptable to the Hungarians, and the antagonism of the Czechs of Bohemia, as well as of the Poles of Galicia, tended further to paralyze the efforts of the Government.

Prussia, which since the Restoration had been content to remain in her subordinate position with regard to Austria in the German Confederation, now entered upon a new and energetic policy after the accession of King William I. in 1861 and the calling of Bismarck into the ministry. A steady effort was made to draw the North German States close to Prussia. Austria was entangled in the complications of the Schleswig-Holstein affair (see Schleswig-Holstein), and in 1864 she found herself involved with Prussia in a war against Denmark for the liberation of the two duchies. The convention of Gastein, in 1865, with respect to the government of the duchies was a makeshift not calculated to relieve the strain on Austria and Prussia. Austria sought to force the hand of Prussia by referring the settlement of the Schleswig-Holstein question to the German Diet. Prussia made a move by occupying Holstein, and the German Diet thereupon summoned the States to mobilize the Federal Army of execution against Prussia. The latter declared the Confederation dissolved, invaded simultaneously Austria and the States that had joined Austria, and in the brief seven weeks' campaign that followed triumphed completely. The victory of the Prussians at Sadowa was followed by the peace of Prague, which dissolved the old Confederation, allowing reorganization without Austria. Italy had been the ally of Prussia, and although the Italian Army and navy were defeated at Custozza and at Lissa, Prussia was able to exact the surrender of Venetia by Austria, which thus ceased to be either a German or an Italian power. See GERMANY and SEVEN WEEKS' WAR.

The catastrophe of Sadowa made it evident to the Austrian Government that a radical change in the internal constitution of the Empire was necessary. Above all, the demands of Hungary, as formulated by her great spokesman, Francis Deák, had to be met. Under the guidance of Chancellor von Beust, Francis Joseph effected a reconciliation with the Magyars on the basis of the restoration to them of their constitutional liberties. This settlement, known as the *Ausgleich* of 1867, established the Austro-Hungarian monarchy on the present dualistic basis. With the adoption of the *Ausgleich*, parliamentary government in Vienna was firmly established. The dual constitution of the monarchy, however, was far from acceptable to the Slavs. The Czechs in particular clamored for autonomy and the restoration of the realm of Saint Wenceslas. The Poles were also loud in their demands. From time to time concessions were made to these conflicting elements, now the Liberal Germans and again the Slavs being foremost in the councils of the Emperor. This conflict of nationalities has found expression in the disgraceful scenes enacted in the Austrian Reichsrat. In the meantime, Hungary has proceeded in the path of political and economic development, undisturbed by the perplexities of her Cisleithan neighbor. Under the guidance of her able foreign minister, Count Andrássy, Austria-Hungary took an important part in the settlement of the situation growing out of the Russo-Turkish War of 1877-78. The Congress of Berlin allowed her to occupy Bosnia and Herzegovina, which was effected only after a bloody struggle (1878).

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AUS'TRIAN HYE'NA, THE. A term of reproach applied to Julius Jakob von Haynau on account of his inhumanity in Hungary and Italy during the revolutionary struggles of 1848-49. Subsequently, while he was on a visit to London, popular feeling against him rose so high that his life was in danger. See HAYNAU, JULIUS JAKOB.

AUSTRIAN LIP. The thick lower lip which was characteristic of the Hapsburgs, and survives to some extent to this day among some princes of that dynasty. It was believed to be derived from Cymbarga, a niece of a king of Poland, who was noted for beauty and unusual strength. According to others, the prominent nether lip was a result of the intermarriage of the earliest Hapsburg knights with the peasant women of the highlands.

AUSTRIAN POLIT'ICAL PAR'TIES. See POLITICAL PARTIES, paragraph *Austria-Hungary.*

AUSTRIAN SWITZ'ERLAND. A descriptive term often applied to the Salzkammergut, in Austria, so called from its beautiful and impressive scenery. See SALZKAMMERGUT.

AUSTRIAN WO'MAN, THE. A contemptuous name for the French Queen, Marie Antoinette, at the time of the Revolution.

AUS'TRO-PRUS'SIAN WAR. See SEVEN WEEKS' WAR.

AUTEROCHE, ō'trôsh', JEAN C. See CHAPPE D'AUTEROCHE.

AUTEUIL, ō'tē'y'. Formerly a country village at the entrance of the Bois-de-Boulogne, now a western quarter of Paris. It is known as the residence of famous literary men, such as Boileau and Molière, and has one of the principal race-courses in France.

AUTHEN'TIC DOC'TOR (Gk. αὐθεντικός, *authentikos*, warranted). A name applied to Gregory of Rimini, an Italian ecclesiastic and author of several theological works, who died in A.D. 1357.

AU'THOR, THE. One of Foote's comedies (produced in 1757), in which he himself took the part of Cadwallader. This latter character was a satirical delineation of a friend of Foote's, whose influence was sufficient to have the piece suppressed.

AU′THORIZED VER′SION of the English Bible. See Bible.

AUTO- (Gk. αὐτός, *autos*, self), a combining form, as the first part of many English words, meaning *self, one's self, by one's self, one's own;* as, e.g. *autobiography*, one's biography, written by one's self; *autograph*, writing in one's own hand.

AUTOCHTHONES, ạ-tŏk′thō-nēz (Gk. nom. plur. αὐτόχθονες, *autochthones*, sprung from the earth itself, from αὐτός, *autos*, self + χθών, *chthōn*, earth). A Greek name for the original inhabitants—not immigrants—of a land, who, according to various local legends, sprang from the earth, rocks, or trees. The Athenians seem to have been especially proud of this name, as indicating that they had always been in possession of their land, though the statement that the ancient nobles wore a golden cicada in their hair, to show their origin from the soil, seems to be due to a grammarian's misunderstanding of the τέττιγες, (*tettiges*), which are probably golden spirals used to secure the hair. Some writers also spoke of the Arcadians and the early inhabitants of Italy as autochthones. Earth-born γηγενής, (*gēgenēs*), though not properly autochthones, were the Greek giants, sons of Earth, who fought against the gods, and the Sparti of Thebes, who sprang from the dragon's teeth sown by Cadmus. The name autochthones is now frequently applied to the original inhabitants of a country, like 'aborigines.' Consult Preller, *Ausgewählte Aufsätze* (Berlin, 1864).

AUTOCHTHONOUS, ạ-tŏk′thō-nŭs (for derivation, see Autochthones). A term employed in the sciences of botany, zoölogy, and paleontology to indicate such plants, animals, or fossils as are indigenous to the places in which they are found. In botany and zoölogy, the term is opposed to 'naturalized.' In paleontology, such fossils as are of the remains of animals that have lived in the immediate vicinity of the deposits in which they afterwards became entombed, are said to be autochthonous to those deposits. On the other hand, such fossils as have been entombed in an earlier deposit (a) having been autochthonous to it, and through erosion and transportation have become separated from (a) and been reëntombed in a second deposit (b), are then said to be heterochthonous to the latter deposit (b).

AU′TOCRAT OF THE BREAK′FAST-TA′BLE, The. A serial contribution to the *Atlantic Monthly*, by Oliver Wendell Holmes, in 1857-58. It is the narrative of alleged conversations at the breakfast-table of a Boston boarding-house Dr. Holmes is himself the autocrat and the chief talker, others being allowed to talk simply for the sake of variety. Subsequently published in book form (1858), the work has long been a popular favorite. Its flashes of wit, its excellent philosophy, and its graces of style, give its author deserved rank with the most delightful essayists of our literature.

AUTO DA FÉ, ou′tō dä fā (Portug. *auto*, act, from Lat. *actus* + *da*, of the + *fé*, faith, from Lat. *fides*, Sp. *auto de fe*). The name given to the procession or ceremony which used to take place in Spain and Portugal at the execution of those condemned to death by the Inquisition. It was generally held on a Sunday, between Whitsunday and Advent, very often on All Saints' Day. At dawn the dismal tolling of the great bell of the cathedral gave the signal to begin the drama of the day, for as such it was looked upon by the people, who thronged to it in troops, believing that they did a good work in merely looking on. Men of the highest rank reckoned it prudent to give their countenance to the holy tribunal at these processions, and even grandees of Castile did not disdain to make themselves familiars of the Inquisition. The procession was led by the Dominicans, carrying the flag of their order and that of the Inquisition; next followed the penitents, on whom only penance had been laid; behind them, and separated by a great cross, which was borne before, came those condemned to death—barefoot, clad in the *sanbenito* (a yellow shirt inscribed with a list of the victim's crimes and painted over with pictures of damnation), and wearing a pointed cap on the head; then effigies of the fugitives, and lastly the bones of dead culprits, in black coffins, painted with flames and hellish symbols. The train was closed by the army of priests and monks. The procession went through the principal streets to the church, where, after a sermon on the true faith, the sentence was announced. In the meantime, the accused stood before a crucifix, with extinguished torches in their hands. After the sentence had been read to them an officer of the Inquisition gave each one of the condemned a blow on the breast with his hand, as a sign that they were given over by that tribunal to the secular power; on which a secular officer took them in charge, had them fettered, and taken to prison. A few hours afterwards they were brought to the place of execution. If they made profession of the Catholic faith at the last moment, they were so far favored as to be first strangled; otherwise they were burned alive, and with them the effigies of the fugitives and the bones of the dead culprits. As a rule, the King, with his whole court, had to exalt by his presence the solemnity of the awful transaction. The celebration of the auto da fé began as early as 1257, though the death penalty was first imposed in 1481. Between 1481 and 1808 more than 340,000 persons suffered punishment at the auto da fé. Of these 32,000 were burned. Heresy was not the only crime thus punished, as is generally supposed, but all grave sins coming under ecclesiastical jurisdiction. The most elaborate auto da fé took place at Madrid, under Charles II., in 1680. America also has had its autos da fé, Mexico celebrating one as late as 1815—the latest recorded. See Inquisition.

AUTOG′AMY (Gk. αὐτός, *autos*, self + γάμος, *gamos*, wedding, marriage). Self-pollination, i.e. a transfer of the pollen of a flower to its own pistil. It is the opposite of allogamy (q.v.). See also Pollination.

AU′TOGRAPH (Gk. αὐτός, *autos*, self + γράφειν, *graphein*, to write). That which is written in one's own hand. It commonly refers to the signature. A holograph is a writing or inscription entirely in the hand of one person. It is not necessarily in written letters or inscribed characters; an original drawing by Rembrandt or a musical score by Mozart is a holograph. On account of the personal interest with which handwriting is invested, as well as the historical value of documents actually written by famous men, the accumulation of autographs has been a favorite pursuit of collectors from very early times. There were large collections among the Greeks and Romans. One of the Ptolemies bargained with the starving Athenians, giving wheat for the privilege of copying holographs of Æschylus, Sophocles, and Euripides. He returned the copies and retained the originals. Pliny the Elder speaks of seeing in the collection of Pomponius Secundus autographs of famous men written two centuries previously. Among the Chinese also autographs were preserved with great respect in early times. During the Sixteenth Century, in Europe, rich collections were made, of which one, brought together as early as 1578, is in the British Museum. Even before this, the custom of inscribing autographs merely for collections had been developed, and there had appeared (first in Germany in the Fourteenth Century) the *Album Amicorum*—an octavo book, bound lengthwise, in which names and sentiments were inscribed. Such books were first used by travelers, who were thus enabled to bring home records of the eminent personages whom they had met during their journeys. Among the Egerton manuscripts in the British Museum is an album dated 1554. Afterwards autograph albums came into general use, and, indeed, were in fashion until the latter part of the Nineteenth Century.

The value set upon autographs by collectors has developed a class of dealers all over the civilized world who sell either privately or at auction. Autographs are described in their catalogues as a.l.s. (autograph letter signed); l.s. (letter signed); d.s. (document signed); a.l.3 (autograph letter, third person); s. (signature cut from document or letter). The high prices paid for good signatures have encouraged forgers. Sometimes forgeries take the form of fabricating literary matter, as when Chatterton produced the poems of Rowley, or when Ireland 'discovered' an original play of Shakespeare. Generally, these forgeries purport to be letters or documents written or signed by famous personages. In America and in England there have been several notable forgeries; but perhaps the most remarkable instance of deceit occurred in France. In 1867, M. Michel Chasles, the first geometrician of France, laid before the French Académie des Sciences letters ostensibly by Pascal, Rabelais, Galileo, and others. When seen by experts, these were recognized as forgeries. It was then discovered that Chasles had bought of a certain Vrain Lucas 27,000 pieces, among which were letters of Mohammed to the King of the Franks, Alexander the Great to Aristotle, Judas Iscariot to Mary Magdalen, and others, written in French, on French paper, bearing a *fleur-de-lys* water-mark. A skillful forger selects the guard-folios of old books, washing the ink with a weak solution of muriatic acid, oxalic acid, or an oxalate of potassium, after which the paper is creased and smudged.

The most notable collection of autographs in England is that of the British Museum. The most valuable autograph in this collection is that of Shakespeare, affixed to a deed; his signed will is preserved in Doctors' Commons. The most valuable private collection in England was formed by the late Alfred Morrison. The gems of the collection are considered to be a holograph letter of Americus Vespucius addressed to his father, and a letter of Mary, Queen of Scots, written to Henry III. of France, six hours before her execution, and confiding to him the care of her son 'as much as he deserves it.' In the French archives, the earliest autograph is a document signed by Thierry III., September 12, 677. One of the largest and most important collections in France was that formed by Benjamin Fillon. The classification was under the following heads, which may serve for suggestion to a modern collector:

I. Inventors and initiators.
II. Rulers.
III. Statesmen.
IV. French Revolution.
V. Discoverers and Explorers
VI. Scholars.
VII. Literary Men
VIII. Actors and Dramatists.
IX. Painters, Sculptors, Architects.
X. Musicians.
XI. Ecclesiastics.
XII. Reformers.
XIII. Warriors.
XIV. Counter-Revolutionary.
XV. Miscellaneous.

In Germany, one of the largest collections was formed by Alexander Meyer Cohn, of Berlin. In the United States, the collections of Thacher, Gratz, Gunther, and others, covering both domestic and foreign fields, compare favorably with the best European collections. In the first of these, the kings of England are represented in an unbroken line from Henry V.; and the kings of France from Charles V., mostly in holograph form. The finest collection of American autographs was formed by Dr. Emmet, and is now in the New York Public Library. It contains the best set of the Signers of the Declaration of Independence, including the only known holograph letter of Thomas Lynch, which was sold for over $5000. Dr. Emmet possessed autographs of nearly every member of the Continental Congress from 1774 to 1789. The basis of an American collection comprises the discoverers and founders, Colonial and Continental characters, literary and scientific personages, soldiers and sailors.

The value of autographs depends not only upon the degree of fame of the writers, but also to some extent upon the rarity of the signatures. Among the rarest desirable names are Da Vinci, Raphael, the younger Bach, Gluck, and Charlotte Corday. Sir Francis Drake, Sir Thomas More, and Milton are exceptionally rare names. Shakespeare is unattainable. Of the 29 Columbus autographs, his descendants are the only private possessors. The rarest names among American explorers are Champlain, La Salle, and Marquette. Among the signers of the Declaration of Independence, Lynch, Gwinnett, Hart, Morton, Heywood, and Middleton, about in the order named, are difficult to secure. A good holograph set of the 'signers,' with no cut signatures, would be worth $25,000. There are not more than 10 or 12 good sets now in private hands. The rarest President is Johnson, with Taylor next.

A respectable collection of autographs will contain from 5000 to 10,000 pieces. It is wise, for those who desire to begin a collection, to study the catalogues of dealers published during the last forty years. Consult Scott and Davey, *Historical Documents* (London, 1891), which contains a bibliography on the subject of autographs. See HANDWRITING.

AUTOGRAVURE, a̤'tô-grăv'ûr. See AUTOTYPE.

AUTOL'YCUS. A waggish thief in Shakespeare's *Winter's Tale*, who robs the Bohemian shepherds under cover of selling them trinkets. By his petty villainies he effects the *lusus* of the play.

AUTOLYCUS (Gk. *Αὐτόλυκος*. *Autolykos*). A mythological character who lived on Mount Parnassus, and who was the father of Anticlea, the mother of Odysseus. Hermes had given him superior skill as thief and perjurer. Later writers represented him as the son of Hermes, and as possessing the power to metamorphose all that he stole: this led to his contest with the more wily Sisyphus (q.v.), who alone outwitted him, and became by Anticlea father of Odysseus. The contest of wits between two clever thieves is a common folk-tale among many peoples.

AUTOLYCUS (c.330 B.C.). A Greek astronomer and mathematician of Pitane in Æolia. He wrote works on the revolving sphere, Περὶ κινουμένης σφαίρας (*Peri kinoumenēs sphairas*) and on the rising and setting of the fixed stars, Περὶ ἐπιτολῶν καὶ δύσεων, (*Peri epitolōn kai dyseōn*). Edition, with Latin translation and scholia, by Hultsch (Leipzig, 1885).

AUTOM'ATISM (Gk. *αὐτόματος*, *automatos*, self-willed, self-acting, from *αὐτός*, *autos*, self + *μάειν*, *maein*, to wish eagerly, to strive). A term variously defined in various departments of knowledge. (1) In philosophy, it is the equivalent of determinism (q.v.). (2) In psychology it is used specifically for Descartes's doctrine that the animals are unconscious automata (see ANIMAL PSYCHOLOGY), and also generally to cover all manifestations of involuntary bodily movement—reflex and secondary reflex movement, concomitant movements. (See ACTION.) (3) In pathology, it denotes the simulation of voluntary actions by involuntary movements, consequent upon certain forms of brain disease. Consult W. B. Carpenter, *Mental Physiology* (Boston, 1891).

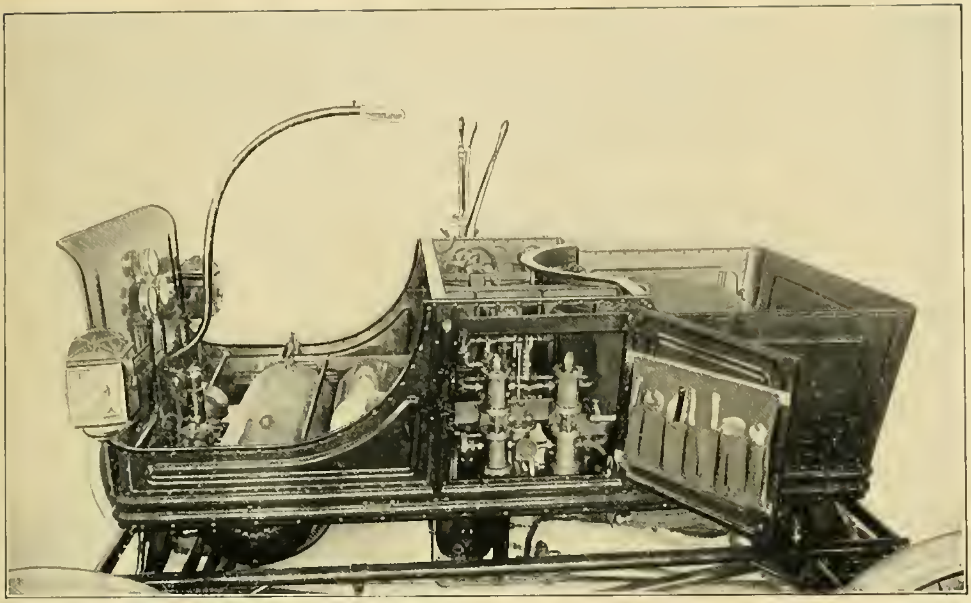
AUTOM'ATON (Lat., from Gk. *αὐτόματος*, *automatos*, self-moving). A piece of mechanism constructed to represent human or animal figures and actions. The construction of automata has occupied men's attention from very early times. As early as B.C. 400, the invention of a mechanical dove which could fly is credited to the Greek mathematician, Archytas, and there are numerous reports of curious automata having been invented at various times and by various persons from the Thirteenth to the Seventeenth Century, most of which are open to considerable doubt. In 1738, however, it is authentically reported that Vaucanson, a Frenchman, exhibited in Paris an automaton representing a flute-player which placed its lips against the instrument and produced the notes with its fingers exactly as a human being does. In 1741 this same mathematician exhibited a flageolet-player which with one hand beat a tambourine, and in the same year he produced a duck which swam, dived, ate, drank, dressed its wings, etc., as naturally as its animated companion. Droz, a Swiss, is reported to have invented a sheep which would bleat and a dog guarding a basket of fruit which would bark if any of the fruit was removed, ceasing only when it was replaced. At the London Exhibition of 1851 Maillardet exhibited a bullfinch which fluttered its wings and gave the note of the bird which it represented. Houdin, the famous conjurer, made a writing and drawing automaton which was operated by clockwork. The chess-player of Kempelen was long regarded as the most wonderful of automata. It represented a Turk of natural size, dressed in the national costume, and seated behind a box resembling a chest of drawers in shape. Before the game commenced, the artist opened several doors in the chest, which revealed a large number of pulleys, wheels, cylinders, springs, etc. The chessmen were produced from a long drawer, as was also a cushion for the figure to rest its arm upon. The figure not being able to speak, signified when the queen of his antagonist was in danger by two nods, and when the king was in check by three. The automaton succeeded in beating most of the players with whom it engaged: but it turned out afterwards that a crippled Russian officer, a very celebrated chess-player, was concealed in the interior of the figure, and that he used this means to escape from Russia, where his life was in danger. In 1875 Mr. J. N. Maskelyn exhibited an automaton under the name of 'Psycho' which represented a seated human figure. To show that the contrivance was not operated by electricity, it was insulated by being mounted on a glass cylinder. This figure moved its head, and from a rack in front of it selected the cards necessary for playing a hand at whist. It would also work out calculations up to 100,000,000, showing the entire total of each calculation by opening a sliding door in a box. Another automaton named 'Zoe,' similar in appearance to the first, and insulated in like manner, was designed by Mr. Maskelyn. This figure would draw the likeness of any person chosen by the spectators from a list of 200 names. Various other automata have been contrived at different times.

In its broad meaning, an automaton is any mechanism which, upon receiving an impulse, will perform a certain cycle of motions by itself. In this sense watches and clocks, and particularly such complicated clocks as that in the Cathedral of Strassburg, are automata. For the best books relating to automata representing human and animal actions, consult: Brewster, *Letters on Natural Magic* (London, 1834); Houdin, *Secrets of Conjuring* and *Memoirs of Houdin* (London, 1891); Ozanam, *Mathematical Recreations*, translated by Hutton (London, 1854).

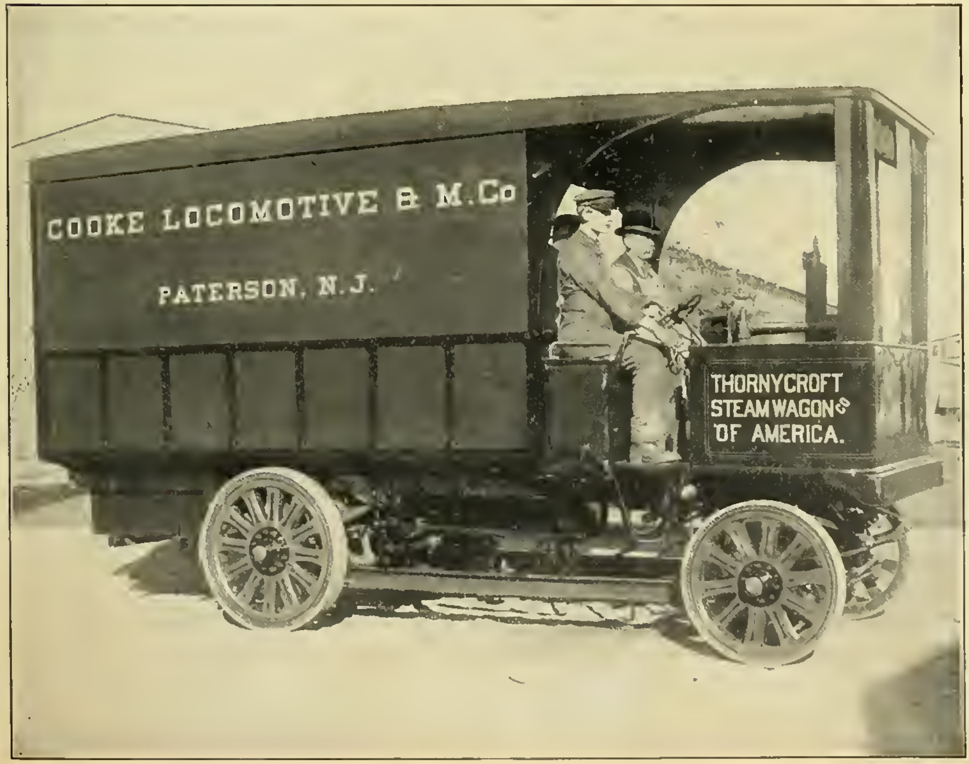
AUTOM'EDON (Gk. *Αὐτομέδων*). A son of Diores: the friend and charioteer of Achilles in the *Iliad*, Bk. xvi., 145 ff.; ibid., xvii., 536 ff. After the death of Achilles, Automedon became the attendant of his son Pyrrhus.

AUTOMEDON (Gk. *Αὐτομέδων*). The name of two epigrammatists of the Greek Anthology, one an Ætolian, the other a native of Cyzicus: one of the two lived probably in the reign of Nerva, the date of the other is quite unknown.

AUTOMOBILE, a̤'tô-mō'bĭl *or* a̤'tô-mô-bēl' (*auto* + Lat. *mobilis*, movable). The generic name which has been adopted by popular approval for all forms of self-propelling vehicles for use upon highways and streets for general freight and passenger service. This definition should not include such self-propelled machines



INTERIOR MECHANISM OF STEAM AUTOMOBILE.



STEAM MOTOR VAN.

as steam road-rollers or traction-engines designed for hauling loaded trucks or vans in train, nor such vehicles as require tracks for their operation. The modern automobile is a development of comparatively recent date, but its inception dates back to the early days of the steam-engine. In 1680 Sir Isaac Newton proposed a steam-carriage to be propelled by the reactive effect of a jet of steam issuing from a nozzle at the rear of the vehicle. In 1790 Nathan Read patented and constructed a model steam-carriage in which two steam-cylinders operated racks running in pinions on the driving-shaft. In 1769-70, Nicholas Joseph Cugnot, a Frenchman, built two steam-carriages. The larger of these is still preserved in Paris, and was designed for the transportation of artillery. The engine of this vehicle consisted of two 13-inch single-acting cylinders, connected by means of pawls to the single front wheel of the wagon. In front of this wheel was suspended a tank-like boiler. In 1784, Murdock, an assistant of James Watt, constructed a model carriage, operated by a 'grasshopper' engine, and in 1786 Oliver Evans, of the United States, suggested the use of steam road wagons to the Lancaster Turnpike Company of Maryland. In 1802 Richard Trevithick built a steam carriage, which was exhibited in London, having driven itself 90 miles from Camborne, where it was built, to London. This carriage brings us to the notable period of steam-coach construction in England, which lasted until about 1836.

FIRST PERIOD OF DEVELOPMENT. The most important of these early labors on the motor vehicle were undoubtedly those of Walter Hancock, an Englishman, and they were carried out during the period between 1824 and 1836. Hancock's first work was the invention of a rather remarkable design of boiler, which reached its final improved form and was patented in 1827. This boiler was first applied to an experimental vehicle, which had three wheels, the single wheel in front being the driver and being driven by a pair of direct-acting, oscillating steam-cylinders. The frame which carried the steam-cylinders and the front wheel was jointed to the main frame of the vehicle so as to permit steering. Many hundred miles were run with this vehicle, which was succeeded by an improved model. This second Hancock steam-wagon was named 'The Infant.' In it the two rear wheels were made the driving-wheels. The oscillating cylinders operated directly a counter-shaft carrying a chain-wheel and located just back of the rear wheels. From the chain-wheel on the counter-shaft a chain-drive was carried to a similar wheel on the rear axle. The boiler and other mechanism for motive purposes was carried substantially over the driving-wheels. The front wheel was used for steering by being journeyed to a swiveling-frame. The chief objection to this second vehicle was the trouble experienced from dust and dirt getting into the driving mechanism. The second 'Infant' was then built, in which a vertical engine replaced the oscillating steam-cylinders of the previous vehicles, and was placed near the middle of the vehicle, between the front and rear wheels. This engine drove a chain-wheel with a chain drive extending back to the rear axle. The remaining parts of the vehicle were similar to the corresponding parts in the first 'Infant.' Hancock next built 'The Era' on much the same designs as the second 'Infant,' and later 'The Enterprise,' both of which were designed for public traffic as steam-coaches. 'The Autopsy,' a second 'Era,' and 'The Automaton' followed in rapid succession, and 'The Automaton' ran as a coach on regular service between Stratford, Paddington, and Islington for 20 weeks, covering 4200 miles, and carrying 12,761 passengers during this period. Hancock's final motor vehicle was for his personal use.

Contemporary with Hancock, two fellow-countrymen, Guldeworthy Gurney and Sir Charles Dance, conducted extensive experiments with a number of vehicles invented and improved by Gurney. For his vehicles Gurney used water-tube boilers and horizontal engines. The engine was placed underneath the body of the vehicle and drove the rear wheels by means of a connecting rod and axle crank, resembling much the driving-gear of a modern locomotive. Gurney's water-tube boiler consisted of two cylindrical drums, placed one above the other and running transversely across the vehicle. The tubes connecting these drums were bent into the form of a letter U, placed horizontally, one free end of the U entering the lower drum and the other free end entering the upper drum, the furnace grate being formed by the lower tubes. This boiler was usually worked at pressures of from 70 pounds to 120 pounds. In passing from the boiler to the engine-cylinders the steam-pipe passed through the furnace casing, thus drying, if not somewhat superheating, the steam. The fire was provided with forced draft by a fan operated by a small engine, and the exhaust of the main engine was employed to heat the feed-water. Some idea of the size of Gurney's vehicles of the coach type is conveyed by the fact that their weight was nearly eight tons, that the engine had 9 × 18-inch cylinders, and that the driving-wheels were 5 feet in diameter. Gurney built a number of vehicles smaller than coaches, in some of which he substituted the engine-exhaust for the original fan for producing draft. For one of Gurney's coaches, Sir Charles Dance devised an improved form of boiler.

While the work of Hancock and Gurney perhaps takes precedence in these early experiments with the steam road vehicle, there were several other inventors who were active. In 1831 two steam-carriages were built by William A. Summers and Nathaniel Ogle, capable of carrying from 16 to 18 passengers each. The boiler used in these vehicles was a vertical water-tube boiler with internal smoke-tubes. The engines were coupled direct to the driving-axle and had 8½ × 18-inch cylinders. In 1834-35 Macerone and Squire ran a steam-coach having a capacity for eight passengers, besides the driver and stoker, and weighing 3½ tons. The boiler was a vertical water-tube boiler and the engines had 7½ × 15¾-inch cylinders. Among others of this same period who developed inventions relating to steam vehicles were Henry James, Dr. Church, Robert Griffith, and Scott Russell. One after another of these vehicles was abandoned, until in 1836 only those of Hancock were on the road; and soon after, these also disappeared from service.

SECOND PERIOD OF DEVELOPMENT. With the disappearance of Hancock's steam vehicles about 1836, all practical, continued effort in the development of the motor vehicle ceased until about

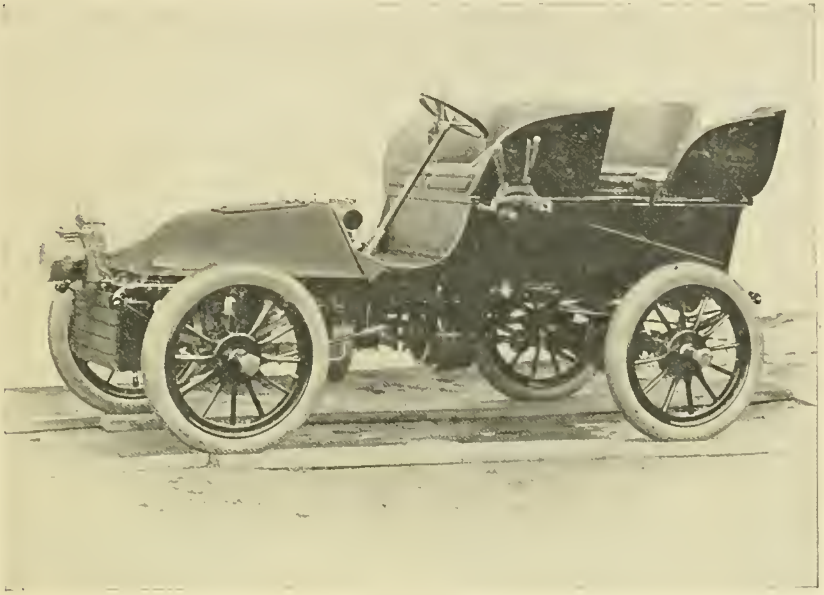
1894, when the period of modern development began. What may be called a second period of development occurred, however, about 1860, when Thomas Rickett, A. F. Yarrow, A. Pattison, H. P. Holt, and others, built several steam vehicles. Quite generally these vehicles approached the traction engine in character, having heavy boilers and engines and large water and fuel space, but room for only a few, usually for not more than four, passengers. They were, in fact, hardly more than self-moving boilers and engines with a few seats attached.

Modern Period of Development. Turning now to the modern period of development, there are first a few inventions to notice, and then the motor-carriage as it existed in its various types in 1902 can be considered. In 1884 Gottlieb Daimler invented his small high-speed gas-engine, followed in 1885 by his invention of a single-cylinder, inclosed-crank and fly-wheel engine. In 1885 the latter engine was applied to a bicycle. In 1886 Carl Benz invented his single horizontal cylinder, water-jacketed engine, which he applied to a three-wheel carriage. In 1889, M. Léon Serpollet invented his water-tube boiler, which he applied to a motor vehicle in 1894. About this same time electric vehicles began to be developed in France and America. Modern automobiles, therefore, may be classified, according to the motive power used, into: (1) Steam vehicles, in which steam is generated in a boiler burning coal, coke, or compressed fuels, or some form of oil, and is supplied to a steam-engine; (2) oil vehicles, using internal-combustion engines with petroleum, gasoline, or naphtha; (3) electric vehicles, using electric motors supplied with current from a storage battery. Other forms of motive power, such as liquid air and compressed gases, have been suggested, but they are not practically employed.

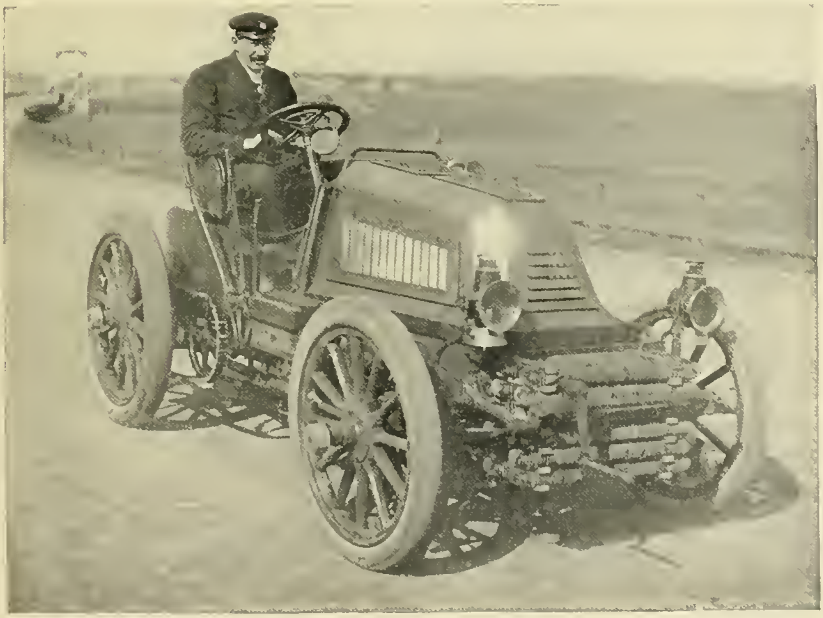
Steam Vehicles. Modern steam automobiles may be divided into two classes: (1) Light vehicles for passenger service and (2) heavy vehicles for trucking freight. In Europe, and particularly in France, the most notable work in light steam vehicles has been done by M. Léon Serpollet, who has applied his instantaneous generator, or boiler, invented in 1889, to motor-vehicle propulsion. The Serpollet boiler is of the water-tube type, the tubes being inclosed in a rectangular shell of two thicknesses of iron, packed between with asbestos. Immediately above and surrounding the burner is a coil of round pipe. These coils receive the water and pass it into a series of tubes, which zigzag back and forth across the space inside the shell. From these tubes the steam and water pass into twisted flat tubes, which deliver superheated steam to the engine. The fuel used with the Serpollet boiler is vaporized oil. Two forms of engines are used in modern Serpollet vehicles, both four-cylinder engines with the cylinders arranged in pairs. In one engine the two pairs of cylinders are placed diagonally, like the arms of a letter Y, so as to make an angle of 45 degrees with each other and with the crank-shaft at the apex of the angle; in the other engine the two pairs of cylinders are placed on the opposite sides of the crank-shaft in the same horizontal plane. The power is conveyed from the crank-shaft to a counter-shaft parallel to the rear axle by chain and from the counter-shaft to the driving-axle by gearing.

Aside from the Serpollet and one or two other European vehicles, the chief development of the light steam automobile has been in America, where about a dozen makers are turning out such vehicles in considerable numbers. American builders use, to a great extent, the fire-tube boiler, but certain makers prefer water-tube boilers for their carriages. The standard American automobile boiler is a cylindrical upright-shell boiler with vertical fire-tubes. The tubes are either copper or steel, and run from 300 to 350 in number. The shell is of steel plate throughout or has steel-plate ends and copper-plate barrels. One prominent maker uses steel ends and a copper barrel, wrapped with two layers of piano wire. The fuel used is some form of mineral oil, usually gasoline, which is burned in special burners which vaporize the oil. The pressure for feeding the oil to the burners is obtained by compressed air, supplied by either a hand-pump or a power-pump, operated from the moving parts of the engine. Automatic feed-pumps, operated from the engine, supply water to the boiler. The boiler is usually arranged to blow off at about 225 pounds pressure, and there is provided an automatic valve arrangement for shutting off the fuel when the boiler pressure reaches a certain amount. The operating steam pressure usually runs from 120 to 180 pounds. The engine commonly used is a double-cylinder, double-acting engine, set vertically, the cylinder diameter varying from 2½ to 3 inches, and the stroke from 3 to 3½ inches. A few vehicles have been provided with vertical compound engines with a by-pass arrangement for turning live steam into the low-pressure cylinder. The exhaust is usually at the rear of the vehicle through a funnel-shaped aperture, inclosed in the water-tank. In one type of vehicle, however, the steam from the engine passes through the hollow tubes of the running frame into a transverse tube, located at the front, and having numerous small orifices to dissipate the steam vapor. Usually the vehicle is driven by a chain from the engine-shaft to the rear driving-axle, but in a few cases an intermediate counter-shaft is used.

Considering now heavier vehicles, both for passengers and freight, it is seen that considerable progress has been made, though such wagons and carriages are not in so wide use as the lighter ones. In America one of the heaviest steam vehicles ever constructed was the 20-passenger omnibus exhibited at New York in 1900. This vehicle is peculiar in having its running gear in two parts, one carrying the rear, or driving wheels, and the other carrying the front, or steering wheels. The wheels are of wood with a steel felly, carrying a 4-inch solid tire, and are mounted on cold-drawn solid steel axles with roller bearings. The motive mechanism consists of a 4 × 5 × 7 × 5-inch compound engine, arranged with a by-pass to permit live steam to be turned into the low-pressure cylinder. This engine, which with the boiler is placed nearly directly over the front wheels, has a chain-drive to a counter-shaft, located about midway of the vehicle. Two chain-drives run from this counter-shaft to the rear wheels. The boiler used is the 25 horse-power water-tube boiler of the climax type. Among steam omnibuses of European make those of De Dion and Bouton, and Scotte, of France, and of the



TOURING CAR.



HEAVY FRENCH RACING MACHINE.

Liquid Fuel Engineering Company, of England, are prominent. A De Dion omnibus built in 1897 had seats for 16 passengers, was 21 feet long, and weighed, loaded, 4 tons 10.8 hundredweights. Of the total length, 6½ feet were taken up by the machinery, which consisted of a boiler, made up of two annular cylindrical vessels, one within the other, connected by water-tubes, and working at 200 pounds pressure, and a horizontal compound engine so arranged that live steam could be thrown into the low-pressure cylinder. In the Scotte vehicles a combined water-and-fire tube vertical boiler is used to drive a two-cylinder vertical engine. Both the De Dion and Scotte vehicles have gear-drives. In the omnibuses of the Liquid Fuel Engineering Company a special boiler of the water-tube type is employed to drive a compound horizontal engine. This same machinery is applied by the company to its freight wagons.

The steam freight wagon has received particular attention in England, and there are now a number of English concerns turning out wagons of this type capable of carrying loads of from two to six tons. The following are descriptions of four of these wagons, which competed in the trials of heavy-traffic motor vehicles, which were instituted by the Liverpool Self-Propelling Traffic Association in 1899. A vehicle built by the Thornycroft Steam Carriage and Wagon Company was 16 feet long by 6½ feet extreme width, with a steel frame and wooden wheels of the military type. The front wheels were 2 feet 9 inches in diameter, and the driving-wheels 3 feet 3 inches, with 5¼-inch tires on all. The boiler was of the well-known Thornycroft curved water-tube type with 82 square feet heating surface, 2.4 square feet grate area, and a test pressure of 250 pounds per square inch. The engine was of the horizontal, compound, reversing type, with 4 and 7 inch cylinders and 5-inch stroke, entirely inclosed in a dust-proof and oil-tight casing. The transmission was by pinions. A two-ton steam lorry, built by T. Coulthard & Co., was fitted with a vertical fire-tube boiler. The heating surface was 77 square feet, and the working pressure was 200 to 225 pounds per square inch, with a test-pressure of 450 pounds; liquid fuel was used with a Leyland burner. The engine was of the triple-expansion, vertical, uni-direction type, with 2¾, 4⅛, and 6 inch cylinders and 5-inch stroke, and was to develop 14 B. horse-power at 500 revolutions per minute. Power was transmitted to the driving wheels by means of spur gearing connecting the engine shaft and first-motion shaft, friction clutches being employed to put the gears into action. A 4-ton steam lorry, built by Clarkson & Capel, had a boiler of the fire-engine type, with small inclined cross-tubes of steel; 66 square feet heating surface, supplemented by 14 square feet of copper feed-coil located in the up-take. The working pressure was 200 pounds and the test pressure 350 pounds to the square inch. Liquid fuel was used to generate steam supplied to burner of the true Bunsen type. The engine was a vertical compound, reversing, with 2¾ and 6 inch cylinders and 4-inch stroke, developing 14 B. horse-power at 600 revolutions. The engine shaft carried a two-speed gear, with the higher speed put into engagement by an expanding clutch, and a Renald chain used to transmit power to the second motion. The Bagleys, of London, submitted a 3½-ton steam lorry with a De Dion boiler, with 70 square feet heating surface and a working pressure of 200 pounds; it is centrally fired with coke. The engine was of the compound vertical, inverted, reversing type, with 4 and 7 inch cylinders and 5-inch stroke, developing 22 B. horse-power at 500 revolutions. Power was transmitted by bevel and spur gearing. It should be said that in all these vehicles the moving parts are inclosed in dust and oil-proof casings.

Gasoline Vehicles. Perhaps the most popular motor for automobiles is some form of oil-engine or internal-combustion motor. The number and variety of these vehicles and of the motors and their arrangement precludes individual description. An internal-combustion motor is one in which the propulsive power is given to the piston by the explosion of vaporized oil, such as benzine or gasoline, in the cylinder. The mechanism comprises, besides the engine and its connections, a carburetter for vaporizing and feeding the oil to the cylinder, and a cooler, by which water is kept in circulation around the cylinder, which is being constantly heated by the successive explosions. (See Gas Engine.) An internal combustion engine, like a steam-engine, transmits its power to a crank-shaft, from which it is led off by a chain drive or gearing to the driving-shaft of the vehicle. These motors are made with one, two, and four cylinders, and are of various powers. The internal combustion engine, or explosive motor, differs chiefly from the steam-engine in that it works at a constant speed, and its motion is communicated by systems of gearing and clutches to the wheels. It will not start up of itself under load, and cannot be reversed. Backing the carriage is effected by gears, and a steady movement of the engine is produced by a fly-wheel. The gasoline motor is unable to run under overload, but on the other hand consumes less fuel, and on this account has a greater radius of action.

Electric Vehicles. The equipment of the modern electric automobile consists of a storage battery for supplying the current, the motor for transforming this current into mechanical power, and the controller for regulating the speed of the motor. In most electric vehicles, two motors or a double-motor drive are employed, the motor being either supported on the rear axle or on the reach. The battery is either placed in a case hung under the body of the vehicle or else inside the body. The motors and other moving parts are placed in dust-proof cases. The efficiency of the battery is of course the most important consideration, and its deterioration with service has to be borne in mind in such commercial applications as automobiles. In 1902 the batteries then in use were considered to be good for 5000 miles by observing ordinary precautions in charging and use. In America electric power has been applied to a great variety of vehicles, including, besides pleasure carriages of various types, delivery wagons, cabs, omnibuses, and trucks. Since 1900 in America 20-passenger omnibuses and heavy trucks with double electric motor drives have been constructed and are in active use. See Storage Battery; Dynamo-Electric Machinery.

The speed attained by the automobiles has been and is being enormously increased, and it is in this respect that there have been the most remarkable developments. These have progressed from time to time, so that at present the horseless carriage rivals modern express trains in the speed of its travel, while it is also able to operate for long distances, requiring supplies of fuel and water in a manner similar to the railway locomotive. One reason for the rapid development of speed which has come about, has been the adoption of the automobile as a means of recreation by individuals, who have arranged various tests of speed and endurance. As a result of the many races which have been held, there have been great increases made in both speed and power, so that the modern racing automobile is supplied with motors far in excess of any practical needs, the sole aim being to develop the highest possible speed. Whereas machines of 3½, 4, and 5-horse power can be employed for ordinary work, racing machines in which as much as 90 or 100-horse power is produced have been constructed. Long-distance road-racing, as well as tests on regular courses, have been extremely popular until restricted by legislative regulations, and wonderfully high speeds have been developed for considerable distances. In 1897, in the Paris-Trouville road race, a speed of 29 miles an hour was attained, and in subsequent races as high a rate as 50 or 60 miles an hour has been reached. If the machine is built for speed, there are, of course, other matters to be taken into consideration than if it were merely employed in ordinary touring, and racing machines, even now, are constructed in distinct types. If such a machine is constructed to run comparatively short distances on a level and well-surfaced road, a mile may be accomplished in from 40 to 60 seconds. In 1901, in races or speed tests, a mile was traversed by automobiles in times varying but little from a minute: and in one instance 51⅘ seconds was the time recorded over a measured course. Tests of endurance between New York and Buffalo have also been held, in which many machines have participated, while an important race was held in 1901 from Paris to Berlin, a distance of 745 miles, which was traversed by the winning machine in 17 hours 3¾ minutes. Racing on public highways, however, has been discountenanced both in Europe and America, and such races in many cases have been forbidden by legislative enactment and governmental decree.

The manufacture of automobiles has become an important industry, the greatest work having been done in the construction of vehicles for touring and recreation: and for this purpose numerous factories have been established, both in the United States and in Europe. There are many clubs which arrange tours and races, and seek to promote the construction of good roads and further the rights of the automobilists on the highway. From time to time large exhibitions are held to show the progress of the industry, and there is a growing literature, as well as a number of journals, devoted to the subject. While the use and construction of automobiles has become so extensive, yet it cannot be asserted positively that a perfect motor vehicle has been developed. The mechanics of automobile construction have made wonderful progress in recent years, yet there are many problems whose solution remains for the future. The early history of steam vehicles, in common with that of other forms of steam-engines, will be found in Thurston, *A History of the Growth of the Steam Engine* (New York, 1901). For a comprehensive descriptive treatise on automobiles, consult Beaumont, *Motor Vehicles and Motors* (London, 1901).

AUTON'OMY (Gk. αὐτονομία, *autonomia*, self-government, from αὐτός, *autos*, self + νόμος, *nomos*, law). The power of self-government possessed by the citizens of the State, or enjoyed within certain limits by the inhabitants of some sub-division of a State, as well as by the members of civil and religious corporations. Autonomy is often used to designate the political condition of ancient Greece, where every town community claimed the right of independent sovereign action. At the present day the term is employed less frequently in the sense of independence than to describe the condition of a country which exercises complete control over its own affairs under the suzerainty of another power. It is in the latter sense that autonomy is used to characterize the status of such territories as Canada and Bulgaria.

AU'TOPHYTE (*auto* + Gk. φύειν, *phyein*, to bring forth, generate). A plant which is independent of organized food materials, such as are found in humus. Opposed to parasite and saprophyte. See SYMBIOSIS.

AU'TOPLASTY (Gk. αὐτόπλαστος, *autoplastos*, self-formed, from αὐτός, *autos*, self + πλάσσειν, *plassein*, to form). The surgical operation for repairing one portion of the body with tissues taken from another part of the same individual. The defect may be due to a lack of development, as in hare-lip; to injury, as in scalds, burns, or mutilations; or to disease, as in lupus and syphilis. The operation is done to improve appearances or to restore function. The skin is most frequently employed. It can be used as (1) a flap from the immediate vicinity carried over to the deficient area, but still receiving its original blood-supply through a pedicle: (2) by totally separating and transplanting the flap—a method rarely successful; (3) by removing in small bits (Reverdius's method), or in strips of considerable size (Tiersch's method) only the superficial layers of the skin, and placing these grafts upon the denuded area. Autoplasty was practiced in India centuries ago, and there are references to it by Celsus, and later by the Calabrian surgeons of the Fifteenth Century. Consult Park, *Surgery by American Authors*, 3d ed. (New York and Philadelphia, 1901).

AU'TOPSY (Gk. αὐτοψία, *autopsia*, a seeing with one's own eyes, from αὐτός, *autos*, self + ὄψις, *opsis*, look, sight). A personal observation. The word is most frequently used to denote the examination of a dead body, for the purpose of determining the cause of death or the alterations resulting from disease or injury. An autopsy is usually held by a medical examiner or coroner, in case of a person found dead, or dying without medical attention, or suspected of having been poisoned or otherwise murdered; or by physicians, in the course of studying diseases, or verifying a diagnosis in an obscure case.

AU'TOSUGGES'TION. Self-suggestion; a man's acceptance, for himself, without command or direction from any other person, of an idea that shall presently issue in action. Autosuggestion may be induced voluntarily or involuntarily—voluntarily, if we fix our attention upon the idea in question and impress it on our minds by attentive consideration; involuntarily, if we are unconsciously influenced by our surroundings. Many persons, e.g. can awake at a certain hour in the morning by suggesting to themselves, the night before, that they will do so; and it is probable that every one can, with practice, attain to some degree of accuracy in such a 'setting' of the mental machinery. The mechanism of arousal in these cases is not wholly clear. The cue for waking is, however, in all probability, given either by a definite amount of illumination of the sleeping-room by the growing daylight, by certain constant noises of the environment, or by the pressure of water in the bladder of the sleeper. For the possibility of inducing hypnosis by autosuggestion, see HYPNOTISM.

Involuntary autosuggestion often plays an important part in psychological experimentation. It is sometimes desirable to make tests or experiments while the observer is, so far as possible, kept in complete ignorance of the object and arrangement of the investigation. (See PSYCHOPHYSICS.) The whole purpose of the 'procedure without knowledge' may, in certain cases, be defeated by autosuggestion. As the work progresses, the observer involuntarily formulates an opinion as to its design—suggests to himself that he is expected to see this, and not that; to judge thus, and not otherwise: so that he is presently observing under a strong self-created bias. The tendency is perfectly well known, and can be guarded against. Experimental psychologists have, indeed, classified laboratory observers as 'objective' and 'subjective' in type, upon the basis of the amount of self-suggestion to which they are liable.

Good instances of autosuggestion are to be found in the literature of suggestive therapeutics. One person is cured by a so-called 'electric belt,' another is invigorated by a band of unknown material fastened to the ankle, a third reads a faith-cure pamphlet and his rheumatism ceases. It is, however, in the hypnotic and other abnormal phases of mind—the hysterical consciousness, the religious ecstasy, the mind of the individual in the mob—that the phenomena of autosuggestion are most striking. Many phenomena which, at their first appearance, were regarded as evidence of supernormal powers and manifestations are reducible (fraud and trickery being eliminated) to autosuggestion. To quote from Jastrow: "The transportation of the senses discovered by Pététin (1787), the hypnotized subjects who, in Braid's day (1850), proved the location of the phrenological organs by the appropriateness of their actions when certain portions of the head were pressed; the sensitiveness to magnets and hermetically sealed drugs asserted by Reichenbach (1845), and later by Bourru and Burot (1885), and Dr. Luys's (1890) absurd trifling with puppets, and probably, too, Charcot's sharp differentiation of distinct hypnotic conditions (1882),—one and all furnish illustrations of the subtle possibilities of unconscious suggestion."

BIBLIOGRAPHY. J. Jastrow, *Fact and Fable in Psychology* (Boston, 1900); Bernheim, *Suggestive Therapeutics* (Paris, 1889); Lipps, *Zur Psychologie der Suggestion* (Munich, 1897).

AU'TOTYPE (*auto* + Gk. *τύπος*, *typos*, impression, type). A photographic print obtained by a gelatin process. Gelatin, when mixed with an alkaline bichromate, as that of ammonium or potassium, becomes insoluble after exposure to light, so that if a photograph be made on a gelatin film, only those portions which have been acted on by light will be retained. This fact has been made the basis of several photo-engraving processes. In the so-called autotype process, the picture is printed directly from the gelatin, which is mounted on a ground-glass plate. In another process the gelatin film is used as a matrix for a plaster cast, from which in turn an electrotype is made, which then may be used for printing a photo-engraving. In Germany and Austria, the word 'autotype' is also applied to the ordinary photo-engraving or half-tone print.

AUTRAN, ô'träN', JOSEPH (1813-77). A French author, born at Marseilles. He first achieved celebrity by an ode dedicated to Lamartine, and entitled *Le départ pour l'Orient* (1832). In the collections of verses entitled *La mer* (1835), *Ludibria Ventis* (1838), and *Les poèmes de la mer* (1855), he reveals the influence of classic models. A martial epic, entitled *Milianah*, celebrating the exploits of the French soldiery in Algiers, appeared in 1842, and a tragedy entitled *La fille d'Eschyle*, performed in the Paris Odéon, in March, 1848, met with great success and secured to its author (together with Augier's *Gabrielle*) the famous Montyon prize. Among the other works of Autran, the following are especially noteworthy: *Laboureurs et soldats* (1854); *La vie rurale* (1856); *Le poème des beaux-jours* (1862).

AUTREFOIS ACQUIT, ô'tr'-fwä'ȧ'kē' (Fr., formerly acquitted), **AUTREFOIS CONVICT**, kôN'vē' (Fr., formerly convicted). The common-law names of pleas in bar to a second indictment for an offense of which the defendant in a criminal prosecution has previously (Fr. *autrefois*) been regularly acquitted or convicted. It is a time-honored principle of English criminal law, that a person who has once been lawfully acquitted or convicted of any offense must not be put in peril a second time for the same offense; and this, notwithstanding the existence of circumstances of aggravation which, if known, would have justified an indictment of a different or more serious crime, or the discovery of fresh evidence not disclosed at the time of the former trial. The fact that there is a substantial variance between the former and the second indictment will not defeat the plea, so long as the original accusation or indictment was sufficient in law to sustain a conviction for the offense subsequently charged. But a previous trial for assault or arson will be no bar to a subsequent trial for murder, manslaughter, or rape resulting from or connected with the offense previously charged. The prior acquittal or conviction pleaded may have been had in any court of competent jurisdiction, domestic or foreign; and the common-law doctrine is not limited, as is generally believed, to capital or other grave offenses. It is in the latter form that it has found expression in the provision of the United States Constitution, that no person shall "be subject for the same offense to be twice put in jeopardy of life or limb" (Amendment V.). Similar provisions are found in most, if not all, of the State constitutions. See JEOPARDY.

AUTREFOIS ATTEINT is a similar plea, attended with the same effects as a former judgment in attainder (q.v.) offered in bar to an indictment or appeal for the same or any other felony. It has become obsolete with the practical abolition of the penalty of attainder. Consult the *Commentaries* of Blackstone and of Kent, and the authorities referred to under the titles CRIMINAL LAW and CONSTITUTIONAL LAW.

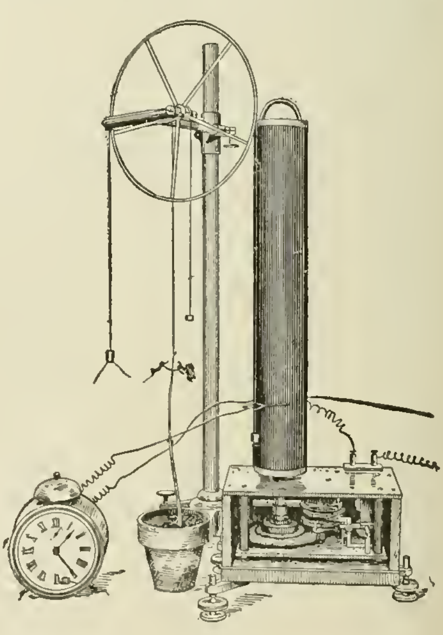
AU'TUMN (Lat. *autumnus*). Astronomically, the third season of the year, in the Northern Hemisphere covering the period from the sun's crossing the equinoctial, at the autumnal equinox, about September 22, till it is on the tropic of Capricorn, at the winter solstice, December 22. Popularly, the autumn in America is the three months of September, October, and November; and in England August, September, and October. The American autumn is often considered the most agreeable part of the year. South of the equator the seasons are, of course, reversed, and autumn extends from about March 22 to June 22.

AUTUN, ō'tēN' (Lat. *Augustodunum*, from Augustus + Gael. *dun*, hill-fort; AS. *dun*, hill; Eng. *down*). A town of France, in the Department of Saône-et-Loire (Burgundy), picturesquely situated at the foot of Mont-Jeu (Map: France, L 5). Autun is the see of a bishop, and has a cathedral of remarkable beauty, built in the Eleventh and Twelfth centuries. The spire belongs to the Fifteenth Century. It has a college, a diocesan seminary, a museum, a library, and is a busy manufacturing centre. Cloth, carpets, leather, stockings, and paper are made in the place. Autun arose near the site of the ancient Bibracte, the chief city of the Ædui. Under the Romans, it was famous for its school of rhetoric. The town was pillaged by the Saracens in 725, and nearly destroyed by the Normans in 888. There still exist at Autun many ruins of Roman structures; most remarkable are the Roman gates, now called Porte d'Arroux, and Porte Saint-André. At the Council of Autun (1094), King Philip I. was excommunicated for divorcing his Queen, Bertha. Population, in 1896, 11,873. Consult Lewis, "The Antiquities of Autun," in Vol. XL., *Archæological Journal* (London, 1883).

AUVERGNE, ō'vârn'y' (Lat. *Arvernia*, from Gæl. *Ar-fearann*, high land, from *ard*, high). An ancient province of south-central France, now included in the departments of Puy-de-Dôme, Cantal, and Haute-Loire. The mountains of Auvergne are the highest elevation in the interior of France, with summits over 6,000 feet above the sea. They represent former volcanic activity on a grand scale, rising in huge conical peaks, which present a scene of wild desolation. The inhabitants are a simple and laborious people, and are accustomed to emigrate each year after the harvest in large numbers to the neighboring regions, or to flock to the great industrial centres of France in search of employment, returning to their homes with their earnings in spring. The region was inhabited in ancient times by the powerful tribe of the Arverni, who ruled over a large part of Aquitania. In the Middle Ages Auvergne was a county. It was permanently united with the French crown in 1532. Consult *La Revue d'Auvergne*, Vols. I.-XIV. (Clermont-Ferrand, 1884-97).

AUWERS, ou'vĕrs, ARTHUR (1838—). A German astronomer, born at Göttingen. In 1859 he became assistant at the Astronomical Observatory of Königsberg: between 1862 and 1866 he carried on his astronomical work at the Observatory of Gotha, and in the latter year was made astronomer to the Berlin Academy of Sciences. In 1878 he became perpetual secretary of the section of physics and mathematics at the Academy. He has also been one of the editors of the *Vierteljahrsschrift* of the German Astronomical Society. Auwers's most important work has been in connection with the Venus transits of 1874 and 1882, and he has edited the results of German observers, whose work he had organized. Among Auwers's numerous other contributions may be mentioned his completion of Sir William Herschel's nebular observation, his heliometric investigations in stellar astronomy, his observations of the proper motion of fixed stars, and the part he has taken in determining the positions of stars, based on the investigations of Argelander.

AUX'ANOM'ETER (Gk. αὐξάνειν, *auxanein*, to make large, to increase + μέτρον, *metron*, measure). A device for observing or recording the growth of plants during intervals too short for direct measurement. The simpler forms of the auxanometer consist of a very light, balanced lever, whose fulcrum is so placed that the length of the long arm is a multiple of the length of the short arm. To the latter a thread from the growing plant is attached. The growth is thus magnified in the ratio of the long arm to the short, usually 10 to 20 times. The long arm traverses a graduated arc, from which its movement may be read, or it may be so placed as to trace its path on a moving smoked surface.



AUXANOMETER

The more elaborate forms consist of a wheel with fine bearings and an accurately balanced rim, about 20 centimeters in diameter, grooved to carry a thread. The same hub has a smaller wheel with a grooved rim, whose diameter is one-tenth or one-twentieth that of the larger. The wheel is supported on a suitable stand, and the plant to be studied is set beneath it. To the plant a silk thread is attached, carried around the small wheel, and weighted just enough to take up the slack by rotating the hub as the plant grows upward. Over the rim of the large wheel a similar thread is passed, carrying on one end a marker, and on the other a counterpoise. The recording apparatus consists of a cylinder driven by clockwork, and carrying smoked paper, the marker bearing against the smoked surface. The cylinder may be rotated continuously by clockwork. In that case, once in 12 hours the marker describes a spiral line of steep or of low pitch, according to the rate of growth. The best forms, however, release the cylinder by means of an electro-magnet, the circuit being closed by a clock, at intervals, when the cylinder is allowed to rotate a short distance (2 to 4 millimeters). This gives a broken line, whose vertical parts represent the growth during the intervals of rotation, and the horizontal parts the distance through which the cylinder turned. A great variety of forms embodying the foregoing principles have been devised and described.

AUX CAYES, ō' kā'. A seaport town of Haiti, situated on the southern coast of the island. Its harbor is good and its export trade considerable (Map: West Indies, L 5). It has also several domestic industries. Population, about 25,000. It is the seat of a United States consular agent.

AUXERRE, ō'sâr' (anciently, *Autissiodorum*). The capital of the Department of Yonne, France, on the Yonne, 90 miles southeast of Paris (Map: France, K 4). It was originally the see-town of a bishop, but its bishopric was abolished by the Napoleonic Concordat, and its fine episcopal palace is used for the prefecture. It is situated on the slope of a hill, in a rich and beautiful district abounding in vineyards. The city is mostly ill-built; the streets are narrow, crooked, and dirty; but its aspect from a distance is very imposing, the most prominent feature being the cathedral Church of Saint Etienne, a remarkably beautiful and imposing structure—one of the most important Gothic buildings in France, which dates from the Thirteenth Century. The Chapter of Auxerre was once one of the richest in France. The churches of Saint Germain and of Saint Pierre (Sixteenth Century) are interesting buildings. There is a curious old clock-tower over a gate-house, "with an ugly skeleton spire of iron bars." The ancient walls of the city have been converted into boulevards. It has a communal college, a museum of antiquities, and a botanic garden. The principal products are wine, calico, serge, woolen cloths, hosiery, earthenware, and leather. The Yonne becomes navigable here, and large quantities of Burgundy wines are sent down it to Paris; there is also a considerable export trade in timber and charcoal. Auxerre was a flourishing town before the Roman invasion of Gaul. It successfully resisted the Huns under Attila, who only ravaged its suburbs. Clovis took it from the Romans. After his death, it became part of the kingdom of Burgundy. The English took it in 1359, but it was retaken by Du Guesclin. Charles VII. gave it up to the Duke of Burgundy. It was finally united to the Kingdom of France by Louis XI. It is the birthplace of the famous Jacques Amyot, once bishop of the see, whose translation of Plutarch is a French classic. Population, in 1896, 15,082. Consult Freeman, "Sens and Auxerre," in Vol. XXXIX., *Archæological Journal* (London, 1882).

AUXIL'IARY. See SCREW PROPELLER.

AUXILIARY VERBS. See VERBS; CONJUGATION.

AUXONNE, ō'sōn' (for Fr. *Au Saône*, on the Saône; ML. *Aussonia*). A French fortress of the second class, in the Department of Côte-d'Or, on the Saône, 17 miles southwest of Dijon (Map: France, L 4). The town has a Sixteenth-Century castle, now used as barracks; an arsenal, a school of artillery, a large powder magazine, and a cathedral dating from the Fourteenth Century. Manufactures of cloth, plaster of Paris, bricks, leather, etc., are carried on, and there is a lively trade in these articles as well as in grain, vegetables, lumber, and brandy. Population, in 1896, 6700. The fortress was built by Vauban in 1673.

AUZOUX, ō'zōō', THÉODORE LOUIS (1797-1880). A French anatomist and physician. He is known as the inventor of the method of making permanent models of anatomical preparations, which are exceedingly important in teaching medicine, and are used at present all over the world. He published *Leçons élémentaires d'anatomie et de physiologie* (1839).

AVA, ä'vȧ (for derivation see below). A ruined city of Burma, and repeatedly its capital; the honor having fluctuated at various times between it and Monchobo, Sagaing (on the opposite bank of the river), Amarapura, and Mandalay, the present capital (Map: Burma, B 2). It stands in latitude 21° 51′ N., on the left bank of the Irrawaddy, here about 4000 feet broad, 10 miles southwest of Mandalay. The river at this point receives two affluents, and these being joined by a canal, the city is rendered circumnavigable. The name is a Hindu and Malay corruption of Ængwa or Aæn-ua, meaning *fish-pond*, as it was built where there were formerly fish-ponds, of which some still remain; in official documents it is designated as Ratnapura, i.e., 'City of Pearls.' The city, which was eight or ten miles in circumference, is surrounded by walls and ditches. Ava is almost a desert, having been reduced to ruins by an earthquake in 1839. The population, at one time estimated at 50,000, in 1891 was 39,477, mostly inhabiting thatched huts. Several Buddhist temples, with gilded domes, give the city a deceitful appearance of grandeur. Consult Trant, *Two Years in Ava* (London, 1827).

AVA, ä'vȧ, ARVA, YAVA, or KAVA (*Piper methysticum*). A plant of the natural order Piperaceæ, possessing narcotic properties. The ava is a shrubby plant, with heart-shaped, acuminate leaves, and very short, solitary, axillary spikes of flowers. It is a native of many of the South Sea islands, where the inhabitants intoxicate themselves with a fermented liquor prepared from its root, or (more accurately) rhizome. The rhizome is thick, woody, rugged, and aromatic. The intoxicating liquor is prepared by macerating it in water. It is often prepared much as the Indians of the Andes prepared *chica* or maize beer—chewing the root, depositing it in a bowl, straining through cocoa-nut husk, and mixing with water or cocoa-nut milk, after which fermentation speedily ensues. The taste is unpleasant to those unaccustomed to it. The intoxication is not like that produced by ardent spirits, but rather a stupefaction like that caused by opium. It is succeeded by a copious perspiration. The habitual use of ava is said to cause a whitish scurf on the skin. The leaf of the ava plant is in some places used with the betel-nut, instead of that of the betel-pepper.

AVADHUTA, ä'vâ-d'hōō'tȧ. A member of the mendicant sect of self-torturing Saivites in the south of India. They abandon all worldly restraints and religious observances and have their passions under complete control.

AV'ALANCHE (Fr. *avaler*, to swallow; originally, let fall down, from Lat. *ad*, to + *vallis*, valley). A mass of snow or ice that slides or rolls down the declivities of high mountains, and often occasions great devastation. Avalanches are given various names, according to their nature. Drift or powder avalanches (*Staublawinen*) consist of snow, which, loose and dry from strong frost, once set in motion by the wind, accumulates in its descent and comes suddenly into the valley in an overwhelming dust-cloud. Avalanches of this kind occur chiefly in winter, and are dangerous on account of their suddenness, suffocating men and animals, and overturning trees and houses by the wind driven in front of them. Another kind of avalanche resembles a landslip. When the snow begins to melt in spring the soil beneath becomes loose and slippery, and the snow slides by its own weight down the declivity, carrying with it soil, trees, and rocks. This is also called a landslide, and is often the cause of great disasters in mountainous regions. The greatest danger is where elevated tracts of moderate declivity are separated from the valleys by precipitous walls of rock; the softened snow of spring, beginning to roll or slide on these slopes, is hurled over the precipice with fearful force into the valleys. Ice avalanches are those that are seen and heard in summer thundering down the steeps, as those of the Jungfrau. They consist of masses of ice that have become detached from the glaciers in the upper regions, and are most common in July, August, and September. See LANDSLIP.

AVAL'LENAU, THE (Welsh, of the apple-trees). A poem of uncertain authorship, though accredited to Merlin, notwithstanding reference to events of the Twelfth Century. Morley quotes Stephens to the effect that the foundation of the poem is the tradition of 140 knights being changed into spirits in the Wood of Celyddon. The significance of the name becomes apparent when it is known that the Celtic heaven is an 'island of apples.' See AVALON.

AVALLON, ȧ'vä'lôN' (anciently Aballo). The capital of an arrondissement in the Department of Yonne, France, 26 miles southeast of Auxerre (Map: France, K 4). It is built on a steep hill of red granite, nearly surrounded by the Cousin. A broad terrace walk, shaded with lime-trees, extends around the town, about 500 feet above the bed of the river. The town is generally well built, and has broad and clean streets. The Church of Saint Lazare is remarkable for its handsome Romanesque portals. Manufactures of various kinds are actively carried on, particularly of woolens and paper; and there are distilleries, tanneries, glassworks, etc. There is also a considerable trade in the produce of the neighborhood. Avallon is of Celtic origin. It was sacked by the Saracens in A.D. 731, and by the Normans in 843; taken by Charles VII. in 1433, retaken by Philip the Good, Duke of Burgundy, in 1455, and pillaged by the troops of the League in 1593. Population, in 1896, 5809.

AV'ALON, variously written *Avallon*, *Avelion*, and *Avilion* (Welsh *Ynys yr Afallon;* see below). The name of the legendary island to which King Arthur was supposed to have been conveyed after being wounded in his last battle. It has been identified with various places, notably with Glastonbury, in Somersetshire. But it seems clear that in the first instance Avalon was nothing but the Celtic Paradise, or Happy Other-World, the abode of the fairies, which was visited by a number of heroes of Welsh and Irish saga. From it Arthur was expected to return ultimately, healed of all his wounds. The origin of the name is doubtful. *Ynys yr Afallon* is commonly understood to mean the 'Island of Apples,' with reference to the fruit that was often described as growing in the land of the blessed. But it is not to be assumed that the name had this meaning from the beginning. Perhaps it was at first not a local name at all, but rather personal. There is evidence of the existence of Avalloc (Welsh, *Afallach*), a King of the Other-World. Consult: J. Rhys, *Studies in the Arthurian Legend* (Oxford, 1891); F. Lot, in *Romania* (Paris, 1899).

AV'ALON. A peninsula forming the eastern part of Newfoundland (q.v.), bounded by Trinity Bay on the north, and Placentia Bay on the south (Map: Newfoundland, G 5). Its coasts are highly indented, forming numerous bays and harbors. It contains the capital, Saint John's (q.v.), and was the place of the first English settlement in Newfoundland.

AVALOS, ä'vá-lōs', FERNANDO FRANCESCO D', Marquis of Pescara. See PESCARA.

AVARE, L', lá'vär' (Fr., 'The Miser'). One of Molière's comedies, based on the *Aulularia* of Plautus, first performed at Paris in 1668. In it the folly and shame of avarice are satirized in the ridiculous situations into which the leading character gets himself. The miser is Harpagon, who keeps his wealth in a casket of gold, and rivals his son, Cléante, in the affections of Mariane. Cléante gets possession of the casket and gives his father the choice of it or of Mariane. Harpagon prefers gold to wife, and thus the two young lovers are happily married.

AVA'RIS (Egyptian *Hat-we'ret*, 'Lake city'). A city of ancient Egypt, situated in the eastern part of the Delta; perhaps to be identified with Tanis, the modern Sân. Avaris was the stronghold of the Asiatic Hyksos, or Shepherd Princes, who invaded and subdued a portion of Lower Egypt. The princes of Thebes resisted their encroachments, and a prolonged war ensued. Finally, about B.C. 1600, Aahmes I., the founder of the Eighteenth Dynasty, forced the foreigners to take refuge in Avaris, which he closely invested by land and by water. After a long and brave resistance the city was captured, and the Hyksos were driven into Southern Palestine. Through this victory the independence of Egypt was secured, and Aahmes united the whole land under his sway. See Amasis; and Tanis.

AVARS, ä'värz, or **AVA'RI**. A tribe of Eastern origin, which made its appearance a century later than the Bulgarians in the countries about the Don, the Caspian Sea, and the Volga. One part of them remained at the Caucasus, another part pressed forward (about A.D. 555) to the Danube, and settled in Dacia. Here they served in Justinian's army, and assisted the Lombards to overturn the kingdom of the Gepidæ; and, about the end of the Sixth Century, under the mighty Khan Bayan, they conquered Pannonia. Later they made themselves masters of Dalmatia; pressed devastating incursions into Germany, as far as Thuringia, and into Italy, where they warred with the Franks and Lombards; and extended their dominion over the Slavs living on, and southward from, the Danube, as well as over the Bulgarians as far as the Black Sea. These nations at last rose against them, and in 640 drove them out of Dalmatia. Confined to Pannonia, they were subdued by Charlemagne, and well-nigh extirpated by the Moravians, so that after 827 they disappear from history. They usually surrounded their settlements with fortifications of stakes driven into the ground, some traces of which, under the name of 'Avarian rings,' are yet found in the countries formerly occupied by them. The results of the most recent criticism show that in all probability the Avars belonged to the same great Turanian stock as the Huns, and that their original residence was the land lying east of the Tobol, in Siberia.

AVARS. One of the Lesghian tribes of Daghestan, in the Caucasus, estimated to number about 100,000. They profess Mohammedanism, and possess a written language with Arabic characters. They are noteworthy from the fact that the great Lesghian warrior and patriot, Schamyl (died 1871), who led the peoples of the Caucasus in their struggle against Russia, was an Avar. Some make the Avars one branch of a Turanian people, the other of which is represented by the Avars who preceded the Magyars into Central Europe, the invading horde dividing on the western shore of the Caspian. But proof of the identity of these two peoples is lacking. The facial characters of many of the Avars suggest Mongoloid affinities, or at least an admixture of Mongolian blood. See Lesghians.

AVATAR, ăv'å-tär' (from Skt. *avatāra; ava*, down + *tar*, to pass over). A term which primarily signifies, in Sanskrit, a descent, but is specially applied to the descent of a Hindu deity upon the earth in a manifest shape, either for beneficent or for retributive ends. It is thus almost synonymous in its signification with the Christian term *incarnation*. The word is sometimes rhetorically employed in English literature. The avatars of Vishnu (q.v.) are the most famous in Hindu mythology.

AVATCHA, å-vä'chå. A bay of considerable dimensions in the Sea of Kamchatka, in latitude 53° N., by far the largest on the shores of the peninsula. It is about 31 miles in circumference. On its shores are four volcanoes. It abounds in seal (Phoca nautica).

AVATCHA. A great active volcano, with two craters, on the Kamchatka Peninsula, in latitude 53° 18′ N., and longitude 158° 47′ E. In many respects it resembles Vesuvius. Its height is variously estimated from 8360 feet to 10,840 feet. The most violent eruption occurred in 1737, and the most recent in 1855.

AVEBURY, ā'bēr-ĭ, or **ABURY**. A small village in Wiltshire, England, 25 miles north of Salisbury, and 6 miles west by north of Marlborough (Map: England, E 5). It is the site of megalithic structures of ancient date. An earthen rampart 40 feet in height originally inclosed a circle about 1100 feet in diameter, outlined by stones averaging 16 feet in height. Within the large circle were two smaller double circles, with monuments at the centre. An avenue of similar stones led from the outer ring in a southeasterly direction to Silbury Hill, the largest artificial hill in Europe, supposed to be a British barrow. Avebury Circle is popularly conjectured to be the remnant of a Druid temple, but its real date or character has not been ascertained. It gives its name to the title of the scientist, Sir John Lubbock (Lord Avebury).

AVEIRO, å-vā'ē-rō. A seaport and seat of a bishopric in Portugal, in the Province of Beira, 31 miles northwest of Coimbra (Map: Portugal, A 2). It is situated at the mouth of the Vouga, on the Rio d'Aveiro, a salt lake or lagoon, extending five leagues to the north, and separated from the sea by a narrow bar of sand. It has a brisk export trade in salt, olive-oil, wine, and oranges. Population, in 1890, 10,000.

AVÉ-LALLEMANT, å'vȧ' läl'mäN', Friedrich Christian Benedict (1809-92). A German criminologist. He was born in Lübeck, studied at Jena, became advocate at Lübeck in 1834, and was a police magistrate in that city from 1851 to 1868. His chief work is *Das deutsche Gaunertum* (4 vols. Leipzig, 1858-62), a study of the history of crime in Germany, with interesting researches into the dialect of criminals. Among his other works are *Die Krisis der deutschen Polizei* (Leipzig, 1861), and *Die Reform der Polizei in Hamburg* (Hamburg, 1862). He also wrote a series of detective stories.

AVÉ-LALLEMANT, Robert Christian Berthold (1812-84). A German physician and traveler, brother of Friedrich Christian Benedict Avé-Lallemant. He practiced medicine for many years at Rio Janeiro. His principal works are *Reise durch Südbrasilien* (1859); *Fata Morgana* (1872), and *Wanderungen durch die Pflanzenwelt der Tropen* (1880).

AVELLANEDA, å-vä'lyå-nä'dȧ, Alonzo Fernandez de. The pseudonym of the author of a second part of *Don Quixote*, published a year before Cervantes's own sequel appeared. The real name of this writer is not definitely known, but is supposed to be either Juan Blanco de Paz, a Dominican friar, or Luis de Aliaga, who was the King's confessor. See Cervantes.

AVELLANEDA, Gertrudis Gomez de (1816-73). A Spanish poet and novelist, born on the island of Cuba, the daughter of a Spanish naval officer. In 1840 she went to Madrid, and in the same year produced a successful drama, *Leonicia*. She wrote several other dramas and many lyrics, which are much praised. Her novels include *Dos mujeres*, *Espatolino* (1844), and *El mulato Sab* (1841), the latter a tale resembling *Uncle Tom's Cabin*.

AVELLINO, ä′vĕl-lē′nō. An episcopal city and the capital of the Province of Avellino, Southern Italy, on the southern Naples-Benevento Railway, 18 miles south of Benevento. The ruins of the ancient Abellinum are nearly 3 miles distant. Near by is the famous Convent of Mount Vergine, founded in 1119, on the ruins of a temple of Cybele, and visited every year by tens of thousands of pilgrims, many of whom ascend the mountain barefoot and crawl on their hands and knees from the church door to the altar. Avellino has a market-place containing beautiful obelisks, an academy, and a theatre; manufactures cloth, hats, and chairs, and is a local centre of trade. The country has been famous for chestnuts and hazel nuts since Pliny's time. Population (commune), in 1881, 20,000; in 1901, 23,760.

AVELLINO, ä′vĕl-lē′nō, FRANCESCO MARIA (1788-1850). An Italian archæologist, born at Naples. He was educated at Rome, and was professor of Greek literature at the university of his native city, and private tutor of the children of Murat (1809-15). In 1820 he was appointed to the chair of political economy at the University of Naples, and afterwards to that of institutions and codes. Besides his catalogue of the valuable collection of coins in the Museo Borbonico (1820), of which institute he became director in 1839, he published a large number of writings under the title of *Opuscoli diversi* (Naples, 1826).

AVE MARIA, ä′vā mä-rē′ä (Lat., hail Mary, from *avere*, to be well, fare well), also ANGELIC SALUTATION. A form of address to the Virgin Mary, expressing honor to her and requesting her intercession; among Roman Catholics in universal and frequent use, generally coupled with the recitation of the Lord's Prayer. The first part, "Hail [Mary], full of grace, the Lord is with thee," is the salutation of the Archangel Gabriel (Luke i. 28) to Mary; the second the address to her of her cousin Elizabeth (verse 42), "Blessed art thou among women, and blessed is the fruit of thy womb"; the prayer which forms the third part, "Holy Mary, mother of God, pray for us sinners now and in the hour of our death," was added in the Fifteenth Century. The daily use of the whole prayer was ordered by Pope Pius V. in 1568. See ROSARY.

AVEMPACE, ä′vām-pä′thā (ABU BEKR MOHAMMED IBN JAHYA, surnamed Ibn Sayig and Ibn Badja, which was later given by the scholastics as Avempace). An Arabic philosopher, physician, and poet. He was born in Saragossa, toward the end of the Eleventh Century, and died at Fez in 1138 as a result of poison administered by an envious physician, Abul Abla ibn Zuhr. At Saragossa he held a high official place, but his philosophical and religious opinions lost him his position. In 1119 we find him in Seville, where he composed his works on logic. From there he traveled to Granada, and then to Fez, where he gained the favor of the Almoravide court. The importance of Avempace lies in the fact that he introduced the Peripatetic philosophy into Andalusia. Besides commentaries on the works of Aristotle, Avempace composed a work mentioned by Averroës, *Fi Tadbir al-mutawabhid* ("Conduct of the Individual"), in which he points out methods necessary for the perfection of the individual who lives surrounded by so many hindrances to such development. By speculation and intellectual effort, and not by mysticism, as Gazali taught, man is enabled to reach the divine intellect, of which Avempace teaches the individual intellect is a part. He wrote works also on medicine and music, and composed poems. Consult Brockelmann, *Geschichte der arabischen Litteratur* (Weimar, 1899).

AVE′NA. See OAT.

AV′ENA′RIUS, *Ger. pron.* ä′fe-nä′rē-ụs, FERDINAND (1856—). A German author, nephew of Richard Wagner, born at Berlin. He devoted himself to the philosophy of art, and in 1887 became the founder of the *Kunstwart*, an art journal of reformatory tendencies. This publication, after many reverses and antagonisms, has become the foremost organ of its class. The poetic works of Avenarius are the idyl *Die Kinder von Wohldorf*, the lyrical-dramatic production *Lebe*, and the collections entitled *Jugendgedichte* and *Stimmen und Bilder*. His critical works comprise the anthology, *Deutsche Lyrik der Gegenwart* and *Max Klinger's Griffelkunst*.

AV′ENA′RIUS, RICHARD (1843-96). A German philosophical writer. He was born in Paris and studied philosophy at the universities of Zürich, Berlin and Leipzig. From 1877 until his death he filled the chair of philosophy at Zürich and acted as co-editor of the *Vierteljahrsschrift für wissenschaftliche Philosophie*. His principal original contribution to philosophy was a theory of experience, which is embodied in his *Kritik der reinen Erfahrung* (2 vols.; Leipzig, 1888-90). He also wrote on Spinoza's pantheism and on other philosophical subjects.

AVENBRUGGER, ä′fen-brụg′ẽr. See AUENBRUGGER.

AVENCHES, å′vänsh′. A village in the Canton of Vaud, Switzerland, 7 miles northwest of Freiburg, and 1½ miles south of Lake Morat, on the ancient shore of which it was located. It is interesting as the Roman Aventicum, the capital of Helvetia, and has the remains of an amphitheatre, old walls, and other buildings, including a Corinthian column (39 feet high) of the temple of Apollo. This column, celebrated by Byron in *Childe Harold* (3d canto, 65th line), is known as Le Cicognier, from the fact that for centuries storks have used it as a nesting-place. Avenches is the German Wiflisburg (castle of Wiflis, a Count of Burgundy of the Seventh Century). The castle is built on the site of the Roman Capitol, and there is a museum in the amphitheatre. During the Roman period Avenches had 60,000 inhabitants. Population, about 2000.

AV′ENEL, JULIAN. A character in Scott's novel, *The Monastery*, who has seized Avenel Castle at the opening of the story. He is the uncle of Mary Avenel.

AVENEL, MARY. The daughter of Lady Avenel and, ultimately, the wife of Halbert Glendinning, in Sir Walter Scott's novels, *The Monastery* and *The Abbot*.

AVEN′GER OF BLOOD. In primitive society, the person, usually the next of kin of the murdered man, charged with the duty of avenging the crime of murder by slaying the murderer. The legal recognition of this duty and its regulation by law are really the beginnings of a system of criminal law. The crimes with which primitive law concerns itself are crimes of violence — man-killing, wounding, and robbery. Their punishment, however, is not, as with us, a matter for the State, but is left to the injured person or to his kinsman. This legalized right of private vengeance, called the blood feud (see Blood Feud), was, in course of time, mitigated by the doctrine of sanctuary (q.v.), which held the vengeance of blood in abeyance until passions had time to cool and the justification of the deed could be made to appear (see Asylum); and by the institution of the wergild (q.v.), whereby the wrongdoer was permitted to commute the natural penalty of his crime for a money payment. This weregild went to the avenger of blood, and the barbarous codes of the early Middle Ages contain elaborate provisions for determining the amounts to be paid and the persons entitled, as avengers of blood, to share in the payment.

The Mosaic law (Num. xxxv.) recognized this institution of primitive society, but placed it under regulations, prohibiting the commutation of the penalty of death for money, and appointing 'cities of refuge' for the manslayer who was not really a murderer. (See City of Refuge.) The Koran sanctions the avenging of blood by the nearest kinsman, but also sanctions the pecuniary commutation for murder. The primitive custom subsists in full force among the Arabs at this day. The hereditary feuds of families, clans, and tribes in barbarous and semibarbarous countries are survivals of this institution.

AVE′NIO. A Roman town in Gallia Narbonensis, now Avignon.

AV′ENS. See Geum.

AV′ENTINE. One of the seven hills of Rome, east of the Tiber. It was included in the city by Servius Tullius, and settled by the plebs in B.C. 455. Of many temples and edifices no traces remain.

AV′ENTI′NUS, Johannes (1477-1534). A German historian, born at Abensberg, Bavaria. His real name was Turmair. He studied at Ingolstadt and at Paris, and taught Greek and mathematics at Cracow, and poetry and forensics at Vienna. In 1512, the Duke of Bavaria called him to Munich, and intrusted him with the education of his sons. Here he wrote his valuable history of Bavaria (*Annales Boiorum*), which occupied him sixteen years. This work was not published until twenty years after his death, and then only with large portions adverse to the Roman Church excised. These, however, were all restored in Cisner's edition. Among his other works are *Chronicon sive Annales Schirenses* (1600) and *Vita Henrici IV.* (1518). Consult Döllinger, *Aventinus und seine Zeit* (1877).

AVENTURINE, â-vĕn′tû-rĭn (from It. *avventurino*, from *avventura*, adventure, chance; refers to its accidental discovery). A transparent to opaque variety of quartz, either red, yellow, or brown, with iridescent spangles of mica, hematite, or other minerals scattered through it. The specimens found at Cape de Gata in Spain have been cut and used as gems; also those found at Glen Fernat in Scotland. A few localities have been reported in the United States. The name Aventurine is also given to certain varieties of feldspar, as orthoclase and oligoclase, which have the property of reflecting light in various colors from points inside the mineral. The best specimens are from Swedestrand, Norway, and excellent varieties have been found near Crown Point, N. Y., and in Statesville, N. C. These are cut and sold as gems, under the name of sunstones. A similar effect was produced by the Venetian glass-makers, who are said to have discovered the method of artificially producing this effect by accidentally dropping brass filings into melted glass.

AVENZOAR, ä′vĕn-zō′är (Abu Merwan Abalmalec ibn Zohr) (1072-1162). A Spanish-Arabian physician. He made earnest efforts to introduce the experimental method into the study and practice of medicine. Some of his works have been published, and one is mentioned by his pupil, the famous Arabian philosopher Averroës. His chief work was named the *Teisir* or *Theisir* (1490).

AV′ERAGE (OF., Low Lat. *averagium*, possibly from OF. *aver*, property, cattle, literally: to have, Lat. *habere*). A medium; any medial amount obtained by comparison of a number of specific cases: e.g. three persons have the respective ages 20 years, 30 years, 50 years; their average is ⅓ (20 + 30 + 50) years, or 33⅓ years. The average of two quantities is called their arithmetic mean. (See Mean.) The process of averaging is of importance in the comparison of statistics, as the average yield of staple products per acre or per year for a period of years; the average monthly shipment of gold to foreign countries; the yearly average of emigration; or the average monthly rainfall. In the case of physical measurements, the items are not generally of equal accuracy. Hence the items are given different weights, the process of averaging becoming more complicated, and the method of least squares (see Least Squares, Method of) is commonly employed.

AV′ERAGE, in Maritime Law. The generic sense of this term in maritime law appears to be: the loss of property while embarked upon a maritime adventure. *Particular average* denotes a loss which is borne by the party whose property is injured or destroyed and toward which others are not bound to contribute. Examples of this are: Carrying away of masts by storm; accidental stranding or collision of the vessel; capture of the ship or cargo by an enemy. *Petty average*, or *customary average*, is applied to certain expenditures, such as pilotage, anchorage, and towage charges in port, which were formerly apportioned among the owners of ship and cargo, but which are now generally provided for in bills of lading.

General average was defined by the International Congress at Brussels in 1888 as follows: "An extraordinary expenditure, or a sacrifice voluntarily made by the captain or pursuant to his orders, for the common good and safety of the ship and cargo." For the adjustment of general-average losses, a body of regulations was adopted by the Association for the Reform and Codification of the Law of Nations, at Antwerp, in 1877, and amended by the Association at Liverpool in 1890. It is known as the York-Antwerp Rules, and is often agreed upon by parties to shipping articles as the measure of their duties and liabilities. In the observance of such an agreement, these rules have no binding force upon litigants and are of value only as a careful statement of the views of experts. The law of general average is a part of the maritime law, or the law of the sea, as distinguished from the municipal law, or law of the land. They were introduced into English jurisprudence from the Roman law, which, in turn, had adopted its principles from the laws of Rhodes. A person's right to general-average contribution does not depend upon an express contract, although it may be modified by agreement. It rests upon mercantile custom; but a custom so definite and so well understood that every mercantile adventure is entered upon with the actual or presumed knowledge on the part of all interested that the right accompanies, and forms a part of, the transaction. Accordingly, some eminent judges have declared that the right now arises from an implied contract.

In order to constitute a case of general average, three things must concur, namely: (1) "A common danger; that is, a danger in which ship, cargo, and crew all participate; a danger imminent and apparently inevitable, except by voluntarily incurring the loss of a portion of the whole to save the remainder. (2) There must be a voluntary jettison, or casting away of some portion of the joint concern, for the purpose of avoiding this imminent peril; or, in other words, a transfer of the peril from the whole to a particular portion of the whole. (3) This attempt to avoid the imminent peril must be successful." It will be noticed that this statement of the principles by the United States Supreme Court is not broad enough to include every case where one person's property is destroyed for the purpose of saving the property of another. The sole object of the sacrifice must be that of saving a ship, its cargo, and crew from a common peril. If the ship or its cargo is sacrificed to save another ship, or other property not included in the common adventure, it is not a case of general average. Again, if the loss is involuntary, it is not the subject of general average. For example, if a ship is attacked by pirates, or by an enemy, anything voluntarily sacrificed by the master of the ship in buying off or getting rid of the assailant is a general-average loss; while anything captured is not. So, if a vessel lying at its dock, or its cargo, is injured or destroyed by local authorities, as incidental to the extinguishment of a fire or the preservation of outside property, it is not a case of general average; but it is such a case if the injury or destruction is authorized by the master, and, therefore, is voluntary. When it is said that the attempt to avoid the peril must be successful, all that is meant is that some portion of the common adventure must be saved from the peril. It is not necessary that the voyage be accomplished, or even that the property saved from the first peril be brought to its destination; its destruction from a second and distinct peril does not affect the general average arising from the first.

There are two exceptions to the rule that sacrifices or expenditures made for the preservation of the whole adventure are made good to the owner of the injured interest by contribution levied on the whole adventure: First, when the loss is due to the fault of the injured owner. Second, when the injured or sacrificed goods were carried on deck; unless such deck cargo was permitted either by the established custom of navigation or by the assent of the owners of the general cargo. The second exception rests upon the general rule of maritime law that the deck of a ship is an improper place for cargo, as its stowage there interferes with the safe navigation of the vessel.

In the absence of a special agreement to the contrary, all the imperiled property saved must contribute to make good the loss of that which was voluntarily sacrificed by the master, or common agent of all. The owner of the sacrificed interest is not reimbursed for his entire loss. On the other hand, he is bound to contribute to his own loss proportionally with his co-adventurers. In other words, the owners of the saved property contribute that percentage of its value which the value of the lost property bears to the value of all that was imperiled. As a rule, the value of a saved interest upon which it must pay contribution is the same as the value upon which it would have received contribution had it been sacrificed. In the case of the ship, this is her fair value to her owners at the time and place of adjustment; in the case of freight, its net value at that time; in the case of cargo, the market value of the goods at the end of the voyage, less charges for freight, duties, and the like. While the ordinary place for adjusting general-average contributions is the port where the voyage was to end, the adjustment may be made elsewhere, either upon the assent of all parties interested, or by reason of necessity as in case of a disaster which prevents the completion of the voyage. When made in accordance with the law of the proper place, the adjustment is binding everywhere.

While the rules relating to general average were established many centuries before insurance was practiced, they are associated quite closely now with marine insurance. See MARINE INSURANCE, and consult the authorities referred to under INSURANCE.

A'VERELL, WILLIAM WOODS (1832-1900). An American soldier, famous as a cavalry leader during the Civil War. He was born in Cameron, N. Y.; graduated at West Point in 1855; and from 1857 to 1859 was engaged in frontier duty against the Indians. During the Civil War he took part, as first lieutenant in a cavalry regiment, in the first battle of Bull Run; and as colonel of volunteers in the Peninsular campaign; was raised to the rank of brigadier-general of volunteers in July, 1862; and in March, 1863, began the series of cavalry raids for which he became famous. On these raids, in 1863-64, he fought numerous battles and skirmishes, destroyed many miles of railroad, captured large quantities of supplies, and did much to disconcert the Confederates and assist Federal commanders in carrying out their plans of campaign. In March, 1865, he was brevetted brigadier-general, for 'gallant and meritorious services' during the war, and major-general for gallantry in the battle of Moorfield, Va., and in May resigned from the service. From 1866 to 1869 he was United States Consul General to British North America. He then became president of a large manufacturing company, and on August 17, 1888, was reappointed captain in the United States army; but retired on the 31st of the same month. He invented a form of asphalt pavement now in general use, the Averell insulating conduits for wires and conductors, and a method for manufacturing cast-steel direct from the iron ore in one operation.

AVER′NUS (Lat., Gk. Ἄορνος, *Aornos*, usually derived from ἀ, *a*, priv. + ὄρνις, *ornis*, bird), now Lago d'Averno. A small, nearly circular lake in Campania, Italy, situated between Cumæ, Puteoli, and Baiæ. It is about a mile and a half in circumference, and occupies the crater of an extinct volcano. It is in some places as deep as 180 feet, and is almost completely shut in by steep and wooded heights. The sulphurous and mephitic vapors arising from the lake were believed in ancient times to kill the birds that flew over it. Owing to its gloomy and awful aspect, it became the centre of almost all the fables of the ancients respecting the world of shades. Here was situated Homer's Nekyia, or entrance to the underworld; here the Cimmerians are said to have dwelt—a people who lived in deep caverns, without ever coming into the light of day, and imparted oracles learned beneath the earth; here also were placed the grove of Hecate and the grotto of the Cumean Sibyl. Agrippa caused the dense woods to be thinned, by which the place lost most of its wildness; and by his orders Cocceius constructed the famous tunnel through the mountain to Cumæ, a work of comparative ease, considering that the hills round about are composed of volcanic tufa. The lake was also connected in ancient times with the Gulf of Baiæ.

A′VE RO′MA IM′MORTA′LIS. A work by F. Marion Crawford (1898) on studies of Rome.

AVERROËS, a-vĕr′rō-ēz (Abu 'l Walid Mohammed ibn Ahmed ibn Roshd) (c.1126-98). A famous Spanish-Arabian philosopher and jurist, born at Cordova. His father and grandfather had been great jurists. His grandfather wrote works on Arabic civil and religious law, and it was only natural that Averroës should turn to law. At Cordova he studied theology and philosophy under Tofail and medicine under Zuhr. His father instructed him in jurisprudence. By Tofail he was introduced to Abu Yakub Yusuf, the Caliph of Morocco. Averroës, however, did not stay long in Morocco. In 1169 he was appointed judge in Seville, and then at his native town, Cordova. In 1182 he was appointed physician to the Caliph of Morocco, but again he left to take a judgeship in Cordova. Being accused of doctrines contrary to orthodox Mohammedanism, he was deprived of his office and exiled to Lucena, where he lived in great poverty. Again he was called to Morocco, where he died.

Averroës regarded Aristotle as the greatest of all the philosophers, and the one who alone was able to attain perfection. His commentaries on the works of Aristotle (extant in Hebrew and Latin translations) exerted a great influence on the scholastic school in Europe. He opposed the orthodox school, and insisted that the Koran must be explained in the light of reason, and not along mystical lines, as Algazali had done. The latter had written a work against philosophy, *The Destruction of Philosophy*. This was answered by Averroës in *The Destruction of the Destruction*, which was translated into Latin by Locatellus (1497-1529). In medicine Averroës sided with Aristotle as against Galen; his medical work, *Colliget*, appeared in Latin (Venice, 1482 and 1514). His complete works were published in 1552 at Venice. For more extended bibliography consult Renan, *Averroès et l'averroïsme* (Paris, 1852); Brockelmann, *Geschichte der arabischen Litteratur* (Weimar, 1899).

AVERSA, ȧ-vĕr′sȧ. An episcopal city in Southern Italy, 12 miles north of Naples (Map: Italy, J 7). It has a cathedral and monasteries, a famous insane asylum equipped with everything to amuse and solace the unfortunates, and an excellent asylum for foundlings. It is famous for *asprino*, a sparkling white wine, and for oil, silk, fruit, and melons. It was near the site of the ancient Atella, whence came the *Atellanæ fabulæ*, coarse farces that in time developed into comedy. The new town was founded in 1029 by the Normans. Population (commune), in 1881, 21,000; in 1901, 23,477.

AVERULINO, ȧ-vā′ro͞o-lē′nō, Antonio. See Filarete.

A′VERY, Elroy McKendree (1844—). An American author, born at Erie, Mich. He fought in the Civil War and retired with the rank of sergeant-major; graduated at the University of Michigan in 1871; taught in various Ohio schools; and from 1893 to 1897 was a member of the State Senate. Among his many publications are elementary text-books in physics and chemistry, which, in various editions, have been much used in the public schools throughout the United States. He is also the author of *Words Correctly Spoken* (Cleveland, 1887), and in 1895 began the preparation of a *Popular History of the United States*, to be published in twelve volumes.

AVERYSBORO, ā′vĕr-ĭz-bûr′ō. A village in Harnett County, N. C., about 20 miles northeast of Fayetteville. Here, on March 16, 1865, during the Civil War, a Confederate force under Hardee made a stand against Slocum's wing of Sherman's advancing army, but was quickly driven back, and during the night retreated upon Smithfield. The Union loss was 77 killed and 477 wounded; the Confederate about 700, including over 200 prisoners.

AVES, ā′vēz (Lat., plur. of *avis*, bird). A class of the phylum Chordata, the birds most distinctly characterized by their exclusive possession of feathers as a covering, and by their structural adaptations to flight. See Birds.

AVES, Los, lōs ä′väs, or **BIRD ISLANDS.** A group of small islands off the north coast of Venezuela, South America, belonging to that republic. They lie east of the Dutch island Buen Ayre, and have extensive guano deposits.

AVESNES, ȧ′vĕn′. The capital of an arrondissement in the Department of Le Nord, France, on the Helpe, 50 miles southeast of Lille. The Church of Saint Nicholas is a fine building dating from the Thirteenth Century. Also noteworthy are the Communal College, a public library, and museum. Manufactures of woolens and hosiery are the chief industries. Avesnes was prominent as a centre of conflict during the Fifteenth Century, and was fortified during the reign of Louis XIV., according to the system of Vauban. It was bombarded after the battle of

Waterloo, and for some time was occupied by the allied troops. Population, in 1896, 6400.

AVES'TA, or ZEND'-AVES'TA. The name under which, as a designation, are comprised the bible and prayer-book of the Zoroastrian religion. The Avesta forms to-day the sacred books of the Parsis or Fire Worshipers, as they are often termed, a small community living now in India, or still scattered here and there in Persia. The original home of these worshipers and of their holy scriptures was ancient Iran, and the faith they profess was that founded many centuries ago by Zoroaster (q.v.), one of the great religious teachers of the East.

The Avesta is, therefore, an important work, preserving as it does the doctrines of this ancient belief and the customs of the earliest days of Persia. It represents the oldest faith of Iran, just as the Vedas do of India. It stands as the law of ancient Media, and later of Persia, and apparently also of Bactria (q.v.). The religion which the Avesta presents was once one of the greatest, and it has left ineffaceable traces upon the history of the world. It flourished fully six centuries before the Christian Era; it certainly became the religion of the later Achæmenian kings, if it was not already the creed of Cyrus, Darius, and Xerxes; but its power was weakened by the conquest of Alexander, and many of its sacred books were lost. It revived again during the first centuries of our own era, but was finally broken by the Mohammedans in their victorious invasion. Most of the Zoroastrian worshipers were then compelled, through persecution, to accept the religion of the Koran; many however, fled to India for refuge, and took with them what was left of their sacred writings. A few of the faithful remained behind in Persia, and though persecuted, they continued to practice their religion. It is these two scanty peoples—perhaps 80,000 souls in India and 10,000 in Persia—that have preserved to us the Avesta in the form in which we now have it.

The designation *Avesta*, for the scriptures, is adopted from the term *Avistāk*, regularly employed in the Pahlavi (q.v.) of the Sassanian time. But it is quite uncertain what the exact meaning and derivation of this word may be. Possibly Phl. *Avistāk*, like the Skr. *Veda*, signifies 'wisdom, knowledge, the book of knowledge.' It may, however, mean 'the law.' The designation Zend-Avesta, though made current by Anquetil-Duperron, as described below, is not an accurate title. It arose by mistake from an inversion of the oft-recurring Pahlavi phrase, *Avistāk va Zand*, 'Avesta and Zend,' or 'the Law and Commentary.' The term *Zand* in Pahlavi (cf. Av. *āzaiñti*), as the Parsi priests now rightly comprehend it, properly denotes 'understanding, explanation,' as opposed to the *Avesta* itself, which some maintain signifies 'the unknown' text that needed explanation in order to be understood. It is certain, in any case, that *Zand* is the name of the later version and commentary of the Avesta texts, the paraphrase which is written in the Pahlavi language. The proper designation for the scriptures, therefore, is *Avesta;* the term *Zend* should be understood as the Pahlavi version and commentary. It is to be regretted that the meaning, application, and reading of the word *abašta* or *abišta* in the old Persian inscriptions is still a vexed problem.

Discovery and History of Research of the Avesta.—Of the religion, manners, and customs of ancient Persia which the Avesta preserves to us, we had but meagre knowledge until about a century ago. What we did know up to that time was gathered from the more or less scattered and unsatisfactory references of the classic Greek and Latin, from some allusions in Oriental writers, or from the later Persian epic literature. To direct sources, however, we could not turn. Allusions to the religion of the Magi, the faith of the Avesta, are to be found in the Bible. The Wise Men from the East who came to worship the Saviour, the babe in Bethlehem, were Magi. Centuries before that date, however, it was Cyrus, the ancient Persian King, whom God called his anointed and his shepherd (Isa. xlv. 1, 13; xliv. 28; 2 Chron. xxxvi. 22, 23; Ezra i. 1-11), and who gave orders that the Jews be returned to Jerusalem from captivity in Babylon. Darius, moreover (Ezra v. 13-17; vi. 1-16), the worshiper of Ormazd, favored the rebuilding of the Temple at Jerusalem, as decreed by Cyrus. Allusions to the ancient faith of the Persians are perhaps contained in Ezek. viii. 16; Isa. xiv. 7, 12. The classical references of Greek and Roman writers to the teachings of Zoroaster (q.v.), which we can now study in the Avesta itself, may be said to begin with the account of the Persian religion given by Herodotus (B.C. 450). To this account may be added references and allusions, though often preserved only in fragments by various other writers, including Plutarch, 'On Isis and Osiris,' and Pliny down to Agathias, about A.D. 560. (See ZOROASTER.) The Armenian writers, Eznik and Elisæus, of the Fifth Century A.D., also refer to the Zoroastrian religion. After the Mohammedan conquest of Persia, we have an allusion by the Arabic writer, Masudi (A.D. 940), who tells of the *Avesta* of Zeradusht (Zoroaster), and its commentary called *Zend*, together with a *Pazend* explanation. The *Abasta* (Avesta) is also mentioned several times by Al-Birudi (about A.D. 1000). The later Mohammedan author, Shaharastani (A.D. 1150), sketches in outline the creed of the Magi of his day. An interesting reference is found in the Syriac-Arabic Lexicon of Bar-Bahlul (A.D. 963) to an *Avastak*, a book of Zardosht (Zoroaster), as composed in seven tongues—Syriac, Persian, Aramæan, Segestanian, Marvian, Greek, and Hebrew. In an earlier Syriac MS. Commentary on the New Testament (A.D. 852) by 'Isho'dad, Bishop of Hadatha, near Mosul, mention is made of the Abhāstā as having been written by Zardosht in twelve different languages. These latter allusions, though late, are all of them important, as showing the continuity during ages of the tradition of such a work as the Avesta, which contains the teachings of Zoroaster, the Prophet of Iran. All these allusions, however, it must be remembered, are by foreigners. No direct Iranian sources had been accessible.

From this time, moreover, till about the Seventeenth Century, we find there was little inquiry into the sacred books of the Persians. One of the first series of investigations into the Greek and Roman sources seems then to have been undertaken by a European, Barnabé Brisson, *De Persarum Principatu* (Paris, 1590). The Italian, English, and French travelers in the Orient next added some information as to the religion and customs of the Persians. Among them may be mentioned the works of Pietro della Valle (1620), Henry Lord (1630), Mandelslo (1658), Tavernier (1678), Chardin (1721), Du Chinon. Most important, however, was the work of the distinguished Oxford scholar, Thomas Hyde (1700). It was written in Latin, and entitled *Historia Religionis Veterum Persarum.* Hyde resorted chiefly to the later Parsi sources; the original texts he could not use, although an Avesta MS. of the Yasna seems to have been brought to Canterbury as early as 1633. Hyde appealed earnestly, however, to scholars to procure MSS. of the sacred books of the Parsis, and aroused much interest in the subject. In 1723 a copy of the Vendīdād Sādah was procured by an Englishman, George Boucher, from the Parsis in Surat, and deposited as a curiosity in the Bodleian Library at Oxford. No one, however, could read the texts. To a young Frenchman, Anquetil-Duperron, belongs the honor of first deciphering them. The history of his labors is interesting and instructive. Happening, in 1744, to see some tracings made from the Oxford MS., and sent to Paris as a specimen, Anquetil-Duperron at once conceived the spirited idea of going to Persia or India, and obtaining from the priests themselves the knowledge of their sacred books. Though fired with zeal and enthusiasm, he had no means or aid to carry out his plan. He seized upon the idea of enlisting as a soldier in the troops that were to start for India, and in November, 1754, behind the martial drum and fife, this youthful scholar marched out of Paris. The French Government, however, recognizing at once his noble purpose, gave him his discharge from the army and presented him his passage to India. After countless difficulties he reached Surat, and there, after many discouragements and in spite of almost insurmountable obstacles, he succeeded in winning the confidence and favor of the priests, with whom he was able to communicate after he had learned the modern Persian. He gradually induced the priests to impart to him the language of their sacred works, to let him take some of the manuscripts, and even to initiate him into some of the rites and ceremonies of their religion. He stayed among the people for seven years, and then, in 1761, he started for his home in Europe. He stopped at Oxford before going directly to Paris, and compared his MSS. with that of the Bodleian Library, in order to be assured that he had not been imposed upon. The next ten years were devoted to work upon his MSS. and translation, and in 1771, seventeen years after the time that he had first marched out of Paris, he gave forth to the world the results of his untiring labors. This was the first translation of the Avesta, or, as he called it, Zend-Avesta (*Ouvrage de Zoroastre,* 3 vols., Paris, 1771), a picture of the religion and manners contained in the sacred book of the Zoroastrians.

The ardent enthusiasm which hailed this discovery and opening to the world of a literature, religion, and philosophy of ancient times was, unfortunately, soon dampened. Some, like Kant, were disappointed at not finding the philosophical or religious ideas which they had looked for; while others missed the high literary value they had expected. They little considered how inaccurate, of necessity, such a first translation must be. Though Anquetil-Duperron had learned the language from the priests, still, people did not know that the priestly tradition itself had lost much during the ages of persecution or oblivion into which the religion had fallen. They did not take into account that Anquetil-Duperron was learning one foreign tongue, the Avesta, through another, the modern Persian; nor did they know how little accurate and scientific training Anquetil-Duperron had had. A discussion as to the authenticity of the work arose. It was suggested that the so-called Zend-Avesta was not the genuine work of Zoroaster, but a forgery. Foremost among the detractors, it is to be regretted, was the distinguished Orientalist, Sir William Jones. He claimed, in a letter published in French (1771) that Anquetil-Duperron had been duped; that the Parsis had palmed off upon him a conglomeration of worthless fabrications and absurdities. In England Sir William Jones was supported by Richardson; in Germany he was supported by Meiners. In France the genuineness of the book was universally accepted, and in one famous German scholar, Kleuker, it found an ardent supporter. He translated Anquetil-Duperron's work into German (Riga, 1776), for the use of his countrymen, especially the theologians, and he supported the genuineness of these scriptures by classical allusions to the Magi. For nearly fifty years, however, the battle as to authenticity still raged. Anquetil-Duperron's translation, as acquired from the priests, was supposed to be a true standard to judge by; little or no work was done on the texts. The opinion that the books were a forgery was gradually, however, beginning to grow somewhat less. It was the advance in the study of Sanskrit that finally won the victory for the advocates ot the authenticity of the sacred books. About 1825—more than fifty years after the appearance of Anquetil-Duperron's translation — the Avestan texts themselves began to be carefully studied by Sanskrit scholars. The close affinity between the two languages had already been noticed by different scholars; but in 1826 the more exact relation between the Sanskrit and the Avesta was shown by the Danish philologian, Rask, who had traveled in Persia and India, and who had brought back with him to the Copenhagen Library many valuable MSS. of the Avesta and of the Pahlavi books. Rask, in a small monograph on the age and authenticity of the Zend Language (1826), proved the antiquity of the language, showed it to be distinct from Sanskrit, though closely allied to it, and made some investigation into the alphabet in which the texts were written. About the same time the Avesta was taken up by the French Sanskrit scholar, Eugène Burnouf. Knowing the relation between the Sanskrit and the Avestan, and taking up the reading of the texts scientifically, through his knowledge of Sanskrit, he found at once philological inaccuracies in Anquetil's translation. Anquetil, he saw, must often have misinterpreted his teachers; the tradition itself necessarily must often have been defective. Instead of this less trustworthy French rendering, he turned to an older Sanskrit translation of a part of the Avesta. This was made in the Thirteenth Century, by the Parsi Neryosangh, and was based on the Pahlavi version. By means of this Sanskrit rendering, and by applying his philological learning, Burnouf was able to restore sense to many passages of which Anquetil had often made nonsense, and he was thus able to throw a flood of light upon many an obscure point. The employment of Sanskrit, instead of depending upon the priestly traditions and interpretations, was a new step: it introduced a new method. This fresh discovery and gain of vantage-ground practically settled the discussion as to authenticity. The testimony, moreover, of the ancient Persian inscriptions deciphered about this time by Grotefend, Burnouf, Lassen, and by Sir Henry Rawlinson, showed still more by their contents and languages, so closely allied to the Avesta, that the work must be genuine. The foundation laid by Burnouf was now built upon by other scholars — Bopp, Haug, Westergaard, Spiegel, Roth, Justi, and later by de Harlez, Mills, Hübschmann, Bartholomæ, and especially Geldner and Darmesteter, in addition to some hardly less known names, Parsis among them. These scholars, using partly the Sanskrit key for the interpretation and meaning of words, and partly the Parsi tradition contained in the Pahlavi translation, have now been able to give us a clear idea of the Avesta and its contents, so far as the books have come down to us. Upon minor points of interpretation, of course, there are, and always will be, individual differences of opinion.

Contents, Arrangement, Extent, and Character.—The Avesta, as we now have it, is but a small remnant of a once great literature. It has come down in a more or less fragmentary condition; not even a single manuscript contains all the texts that we now have; whatever we possess has been collected together from various codices. All that survives is commonly classed under the following divisions or books: (1) The Yasna, (2) the Vīspered, (3) the Yashts, (4) a collection of minor texts, (5) the Vendīdād, (6) Fragments. Among these divisions, not counting the Fragments, two groups are recognized. As used in the service of worship, the Vendīdād, Vīspered, and the Yasna are traditionally classed together for liturgical purposes, and form the Avesta proper. In the manuscripts these three books appear in two different forms. If they are kept separate as three divisions, each part is then usually accompanied by a Pahlavi version. On the other hand, since these three books are not recited each as a whole, but the chapters of one book for liturgical purposes are mingled with another, on this account the MSS. often present them in their intermingled form, portions of one inserted with the other, and arranged exactly in the order that they are to be used in the service. In this latter case the Pahlavi translation is omitted, and the collection is called the Vendīdād Sādah, or Vendīdād pure—i.e. text without commentary. The second group, the minor prayers and the Yashts, which the MSS. often include with these, is called the Khordah Avesta, or 'Small Avesta.' Of the greater part of the latter there is no Pahlavi rendering. The contents and character of the several divisions may now be taken up in detail.

(1) The *Yasna*, 'sacrifice, worship,' is the chief liturgical work of the sacred canon. It consists principally of ascriptions of praise and prayer, and in it are inserted the Gāthās, or 'hymns,' verses from the sermons of Zoroaster (q.v.), which are the oldest and most sacred part of the Avesta. The Yasna (Skt. *yaiñá*) comprises 72 chapters, called *Hā, Hāiti*. These are the texts recited by the priests at the ritual ceremony of the Yasna (*Izashne*). The book falls into three nearly equal divisions. The first part (chap. 1-27) begins with an invocation of the god Ormazd and the other divinities of the religion; it gives texts for the consecration of the holy water, *zaothra*, and of the *baresma*, or bundle of sacred twigs, for the preparation and dedication of the Haoma, the juice of a certain plant—the Indian Soma—which was drunk by the priests as a sacred rite, and the offering of blessed cakes, as well as a meat-offering, which likewise were partaken of by the priests. Interspersed through this portion, however, are a few chapters that deal only indirectly with the ritual; these are Ys. 12, the later Zoroastrian creed, and Ys. 19-21, catechetical portions. Then follow the Gāthās—literally 'psalms,' or 'songs' (chap. 28-53), metrical selections or verses containing the teachings, exhortations, and revelations of Zoroaster. The Prophet exhorts his followers to avoid the evil and choose the good, the kingdom of light rather than that of darkness. (For the theology of the Gāthās, see ZOROASTRIANISM.) These Gāthās are written in metre, and their language is more archaic than, and somewhat different from, that used elsewhere in the Avesta. The Gāthās, strictly speaking, are five in number, and are arranged according to the metres; they comprise 17 hymns (Ys. 28-34, 43-46, 47-50, 51, 53), and they must have been chanted during the service. In their midst (chap. 35-42) is inserted the so-called Yasna of the Seven Chapters (*Haptanghāiti*). This is written in prose, and consists of a number of prayers and ascriptions of praise to Ahura Mazda, or Ormazd, the archangels, the souls of the righteous, the fire, and the earth. Though next in antiquity to the Gāthās, and in archaic language, it represents a somewhat later and more developed form of the religion which in the Gāthās proper was just beginning. The third part (chap. 52, 54-72) of the latter Yasna (*saparō yasnō*) consists chiefly of praises and offerings of thanksgiving to different divinities.

(2) The *Vīspered* (Av. *vīspē ratavō*) consists of additions to portions of the Yasna, which it resembles in language and in form. It comprises 24 chapters (called *Karde*, literally, 'sections'), and it is about one-seventh as long as the Yasna. In the ritual, the chapters of the Vīspered are inserted among those of the Yasna. It contains invocations and offerings of homage to 'all the lords' (*vīspē ratavō*): hence the name Vīspered.

(3) The *Yashts* (*yešti*, 'worship by praise') consist of 21 hymns of praise and adoration of the divinities, or angels, *Yazatas* (Izads), of the religion. The chief of these are Ardvī-Sūra, the goddess of waters (Yt. 5), the star Tishtrya (Yt. 8), the angel Mithra, the divinity of truth; the Fravashis, or departed souls of the righteous, and the genius of victory, Verethraghna, and of the Kingly Glory (Yt. 19.). They are written mainly in metre, with some poetic merit, and they contain much mythological and historical matter that may be illustrated by Firdausi's later Persian epic, the *Shāh-Nāmah.*

(4) The minor texts, *Nyāishes, Gāhs, Sīrozahs, Afrīngāns*, consist of brief prayers, praises, of blessings recited daily, or on special occasions.

(5) The *Vendīdād*, or 'law against the dævas, or demons' (*vīdaēva dāta*), is a priestly code of 22 chapters (*Fargard*), corresponding to the Pentateuch in our Bible. Its parts vary greatly in time and in style of composition. Much of it must be late; some of it even as late, perhaps, as the First or Second Century of the Christian Era; but much of the material is very old. The first chapter (Farg. I.) is a sort of Avestan Genesis, a dualistic account of creation. Chapter 2 sketches the legend of Yima, the Golden Age, and the coming of a destructive winter, an Iranian flood. Chapter 3 teaches the blessings of agriculture; chapter 4 contains legal matter—breaches of contract, assaults, punishments; chapters 5-12 relate mainly to the impurity from the dead; chapters 13-15 deal chiefly with the treatment of the dog; chapters 16, 17, and partly 18, are devoted to purification from several sorts of uncleanness. In chapter 19 is found the temptation of Zoroaster and the revelation; chapters 20-22 are chiefly of medical character. In the ritual, the chapters of the Vendīdād are inserted among the Gāthās.

(6) Besides the above books, there are a number of fragments, one or two among them from the Hādhōkht Nask. There are also quotations or passages from missing Nasks; likewise glosses and glossaries. Here belong the *Nīrangistān, Aogemadaēca, Vijtrkarī, Dīnāk, Frahanjiām*, and other fragments. These are all written in the Avesta language, and are parts of a once great collection. Under the Zoroastrian religious literature, though not written in the Avestan language, must also be included the works in Pahlavi (q.v.), many of which are translations from the Avesta, or contain old matter from the original scriptures.

From the summary given, it will be seen that our present Avesta is rather a prayer-book than a bible. The Vendīdād, Vīspered, and Yasna were gathered together by the priests for liturgical purposes. It was the duty of the priests to recite the whole of these sacred writings every day, in order to preserve their own purity, and to perform the rites of purification or give remission of sins to others. The solemn recitation of the Vendīdād, Vīspered, and Yasna at the sacrifice might be compared with our church worship. The selections from the Vendīdād would correspond to the Pentateuch when read; the preparation, consecration, and presentation of the holy water, the Haoma-juice, and the offering of the Yasna and Vīspered would answer to our communion service; the metrical parts of the Yasna would be hymns; the intoning of the Gāthās would somewhat resemble the Lesson and the Gospels, or even the sermon. In the Khordah Avesta, the great Yashts might perhaps be comparable to some of the more epic parts of our Bible; but as being devoted each to some deity and preserving much of the old mythology, they really have hardly a parallel, even in the Apocrypha.

Such, in brief outline, are the contents of our books known as the Avesta to-day; but, as implied above, this is but a remnant of a literature once vastly greater. This we can judge both from internal and from historical evidence. The character of the work itself, in its present form, sufficiently shows that it is a compilation from various sources. This is further supported by the authority of history, if the Parsi tradition, going back to the time of the Sassanidæ, be trustworthy. Pliny (*Hist. Nat.* 30, 1, 2) tells of 2,000,000 verses composed by Zoroaster. The Arab historian, Tabari, describes the writings of Zoroaster as committed to 12,000 cowhides (parchments); other Arabic references by Masudi, and Syriac allusions to an Avesta, which must have been extensive, have been noted above. The Parsi tradition on the subject is contained in the Rivāyats, and in a Pahlavi book, the *Dēnkart*. The *Dēnkart* (Bk. III.) describes two complete copies of the Avesta. These each comprise 21 Nasks, or Nosks (books). The one deposited in the archives at Persepolis perished in the flames when Alexander burned the palace in his invasion of Iran. The other copy, it is implied, fell into the hands of the Greeks, and by them was translated into the Greek language. From that time the scriptures, like the religion under the Græco-Parthian sway, lived on, partly in scattered writings and in the memories of the priests, for nearly 500 years.

The first attempt again to collect these writings seems to have been begun under the reign of the last Arsacidæ (q.v.), just preceding the Sassanian dynasty. Pahlavi tradition, preserved in a proclamation of King Khosru Anushirvan, or Chosroes I. (531-579), says it was under King Valkash that the collection was begun of the sacred writings, as far as they had escaped the ravages of Alexander, or were preserved by oral tradition. The Sassanian dynasty (A.D. 226) next came to the throne. This house were genuine Zoroastrians and warm supporters of the faith, and they brought back the old religion and raised it to a height it had hardly reached even in its palmiest days. The first Sassanian monarchs, Artakhshīr Pāpakān (Ardashīr Bābagān, 226-241) and his son, Shahpuhr I., or Sapor (c.241-272), eagerly continued the gathering of the religious writings, and the Avesta again became the sacred book of Iran. Under Shahpuhr II. (c.309-380) the final revision of the Avesta texts was made by Ātūrpāt Māraspend, and then the King proclaimed these as canonical, and fixed the number of the Nasks, or books.

Of these Nasks, 21 were counted, and a description of them, as noted, is found in the Rivāyats, and in the Dēnkart; each received a name corresponding to one of the twenty-one words in the Ahuna Vairya (Honovar), the most sacred prayer of the Parsis. Three groups or classes, moreover, were recognized in subdividing these 21 books: First, the *Gāthā* or *Gāsān* group, a theological series; second, the group of the law, *Dāt*; and third, a miscellaneous class, *Hadha-Māthra*, partly metaphysical. Each of these Nasks contained both Avesta and Zend—i.e. original scripture and commentary. This tradition is too important to be idly rejected. Its contents give an idea of what may have been the original extent and scope of the books of the Avesta. The subjects said to have been treated in the 21 Nasks may practically be described, in brief, as follows: Nask 1 (twenty-two sections), on virtue and piety; 2 (likewise twenty-two sections), religious observance; 3 (twenty-one sections), the Mazdayasnian religion and its teachings; 4 (thirty-two sections), this world and the next, the resurrection and the judgment; 5 (thirty-five sections), astronomy; 6 (twenty-two sections), ritual performances and the merit accruing; 7 (fifty sections before Alexander, thirteen then remaining), chiefly political and social in its nature; 8 (sixty sections before Alexander, twelve remaining), legal; 9 (sixty sections before Alexander, fifteen preserved), mainly religious wisdom and advice; 11 (sixty sections before Alexander, six preserved), religion and its practical relations to man; 12 (twenty-two sections), physical truths and spiritual regeneration; 13 (sixty sections), virtuous actions, and a sketch of Zoroaster's infancy; 14 (seventeen sections), on Ormazd and the Archangels; 15 (fifty-four), justice in business and in weights and measures, the path of righteousness; 16 (sixty-five sections), on next-of-kin marriage, a tenet of the faith; 17 (sixty-four sections), future punishments, astrology; 18 (fifty-two sections), justice in exercising authority, on the resurrection, and on the annihilation of evil; 19, the Vīdēvdād, or Vendīdād (twenty-two sections), on pollution and its purification; 20 (thirty sections), on goodness; 21 (thirty-three sections), praise of Ormazd and the Archangels.

During the five centuries after the ravages of Alexander, much, doubtless, had been lost, much forgotten. The Parsi tradition acknowledges this itself when it says above, for example, that the seventh Nask consisted originally of fifty sections, but only thirteen remained 'after the accursed Iskander (Alexander).' So says the Dēnkart and so the Rivāyats. Like statements of loss are made of the eighth, ninth, tenth, eleventh Nasks. The loss in the five centuries from the invasion of Alexander till the time of the Sassanian dynasty was but small in comparison with the decay that overtook the scriptures from the Sassanian times till our day. The Mohammedan invasion and the inroads made by the Koran proved far more destructive. The persecuted people lost or neglected many portions of their sacred scriptures. Of the twenty-one Nasks that were recognized in Sassanian times as surviving from the original Avesta, only one single Nask—the nineteenth, the Vendīdād—has come down to us in its full form. Even this shows evidence of having been patched up and pieced together. We can, furthermore, probably identify our present book of the Yasna and Vīspered with the Staot Yasht (*staota yesnya*), or Yasht (*yasnya*), as it is also called. The two fragments, Yt. 21 and 22 (as printed in Westergaard's edition) and Yt. 11, in its first form, are recognized by the MSS. as taken from the twentieth, or Hādhōkht Nask. The Nīrangistān, a Pahlavi work, contains extensive Avestan quotations, which are believed to have been taken from the Hūspāram, or seventeenth Nask. Numerous quotations in Pahlavi works contain translations from old Avestan passages. The Pahlavi work, Shāyast-lā-Shāyast, quotes briefly from no less than thirteen of the lost Nasks; the Būndahishn and other Pahlavi books give translations of selections, the original Avesta text of which is lost. Grouping together all the Avesta texts, we may roughly calculate that about two-thirds of the total scriptures have disappeared since Sassanian times.

The present form of the Avesta belongs to the Sassanian period. Internal evidence shows that it is made up of parts most varied in age and character. This bears witness to the statement that during that period the texts, so far as they had survived the ravages of Alexander, and defied the corrupting influence of time, were gathered together, compiled, and edited. The character of the texts, when critically studied, shows the method that must have been adopted. According to the record of Khūsrō Anōshīrvān (A.D. 531-579), referred to above, King Valkhash, the first compiler of the Avesta, ordered that all the writings which might have survived should be searched for, and that all the priests who preserved the traditions orally should contribute their share to restoring the original Avesta. These texts, as collected, were reëdited under successive rulers, until, under Shāhpūhar II. (c.309-379 A.D.), the final redaction was made by his prime minister, Atūr-pāt Māraspend. It is manifest that the editors used the old texts as far as possible; sometimes they patched up defective parts by inserting other texts; occasionally they may have added or composed passages to join these, or to complete some missing portion. In this respect the textual criticism by means of metrical restoration is most instructive. Almost all the oldest portions of the texts are found to be metrical; the later, or inserted portions, are, as a rule, but not always, written in prose. The grammatical test is also useful; the youngest portions generally show a decay of clear grammatical knowledge. The metrical Gāthās in this respect are remarkably pure. They are, of course, the oldest portion of the text, dating from Zoroaster himself, despite the view of Darmesteter, who wished to bring the date of their completion down to the first Christian Century. The longer Yashts, and the metrical portions of the Yasna, contain much that is very old; in point of time these parts would probably fall but a few centuries later than the Gāthās. The Vendīdād in this respect is most incongruous. Some parts of it are doubtless of great antiquity, though corrupted in form; other parts of it, like the younger portions also of the Yashts, may be quite late. The same is true of formulaic passages throughout the whole of the Avesta, and of some of the ceremonial or ritual selections in the Vīspered and Nyāishes, etc. Roughly speaking, the chronological order of the texts would be somewhat as follows: I. Gāthās (Ys. 28-53), including (II.) the Yasna Haptanghāiti (Ys. 35-42), and some other compositions, like Ys. 12; Ys. 58 in the Gāthā dialect. III. Metrical Yasna and Yashts, Ys. 9-11; Ys. 57, 62, 65; Yt. 5, 8, 9, 10, 14, 15, 17, 19; portions of Vd. 2, 3, 4, 5, 18, 19, and scattered verses in the Vīspered and Afrīngāns, etc. In such cases it is generally, but not always, easy to discover, by style and language, where old material failed and the hand of the redactor came in with stupid or prosaic additions. Considerable portions of our present Avesta, especially the entire Gāthās, we may regard as coming directly from Zoroaster himself; still, additions from time to time must have been made to the sacred canon from his time on till the invasion of Alexander. The so-called copy of the Zoroastrian Bible, which it is claimed was destroyed by that invader, doubtless contained much that was not directly from the founder of the faith, but was composed by his apostles and later followers. The Parsis, however, generally regard the whole work as coming directly from Zoroaster; this is a claim that even the Avesta itself hardly makes. The Gāthās, however, undoubtedly came directly from the Prophet; the Avesta itself always speaks of them as 'holy,' and especially calls them the 'five Gāthās of Zoroaster.' We may fairly regard many other portions of the Avesta as direct elaborations of the great teacher's doctrines, just as the Evangelists have elaborated for us portions of the teachings of Christ.

In regard to the locality in which we are to seek the source of the Avesta and the cradle of the religion, opinions have been divided. Some scholars would place it in the west, in Media; others would still maintain that we are to look to the east of Iran, to Bactria, as its source; or again to Afghanistan or Khorassan for the home of the Avestan language. Each of these different views probably has some right on its side, and we shall perhaps not go far astray if we regard the Avesta as coming partly from the East and partly from the West. We know that a number of its scenes may be placed in the east or southeast of Iran; but other scenes are best ascribed to the west, where Zoroaster first appeared. On the question of his original home, see the article ZOROASTER. The language itself of the texts, as used in the church, became a religious language, precisely as did Latin, and, therefore, was not confined to any place or time. We may regard the Avesta as having been worked upon from Zoroaster's day down to the time of the Sassanian redaction.

The Pahlavi Version of the Avesta.—To the period of the Sassanian editing of the texts belongs the Pahlavi translation and interpretation of the Avesta. At the date when the texts were compiled and edited, the general knowledge of the language of the Avesta and the understanding of the sacred texts was far from perfect. The preparation of a translation or version became necessary. Accordingly, the great body of the texts was rendered into Pahlavi, the language used by Persia at the time of the Parthian Arsacidæ and the Sassanidæ (q.v.). The Pahlavi version and interpretation of the Yasna, Vīspered, and Vendīdād, each entire, with some portions of the other texts, has been preserved. We have not yet so thorough an understanding of the Pahlavi version of the old texts as might be wished; but as our knowledge of this translation increases, we shall see more and more its importance. Owing to the somewhat imperfect knowledge of the Avestan texts at the time when the version was made, and owing to the unskillful and peculiar method in which the Pahlavi translation is made, it abounds in numerous errors and inaccuracies. It is often, however, of the greatest value in interpreting allusions, and particularly in giving hints for the meanings of obscure words, and in such matters is our best and only guide. When more fully understood and used in connection with the 'comparative method,' referring to the Sanskrit, in interpreting the sacred texts, the 'traditional method' or native explanation is destined to win great results. The 'traditional' and the 'comparative' methods must go hand in hand.

Manuscripts of the Avesta.—The oldest manuscript that we possess of the Avesta dates from the middle of the Thirteenth Century. From that date onward we have a considerable number of codices still extant. They come to us from India and from Yezd and Kerman, in Persia. The Parsi priests, especially the Dasturs, Dr. Jamaspji Minocheherji, and Peshotan Behramji, and their friends have shown princely generosity in aiding Western scholars in editing texts by putting valuable MSS. in their possession. It is thus that it was possible for the new edition of the Avesta texts, by Professor Geldner, of Berlin, to be presented in so critical a manner.

The importance of the Avesta lies not alone in the field of philology, ethnology, and early literature, but also in the investigation of comparative religion. Resemblances to Christianity in its teachings become significant when we consider the close contact between the Jews and the Persians during the Babylonian Captivity.

Language of the Avesta.—The language in which the Avesta is written may be best termed *Avestan*, or simply *Avesta*. The designation *Avesta* for the language, as well as the book, is in keeping with the Pahlavi *Avistāk*, which is used both of the tongue and of the scriptures. The term *Avestan*, both for the language and as an adjective, is to be in some respects preferred, in order to distinguish the speech from the work itself. The term *Zend* for the language, as noted above, is a misnomer. The designation Old Bactrian, sometimes used for this tongue, has little to recommend it. The language of the Avesta belongs to the Iranian group. With the ancient Persian inscriptions it makes up the Old Iranian division. The later Iranian languages, New Persian, Kurdish, Afghan, Ossetish, Baluchi, Pamir, and other dialects, complete the younger division. The intervening Pahlavi with its Pāzand, and Parsi, does not quite complete the link between the divisions. (See IRANIAN LANGUAGES.)

The alphabet in which the Avesta is written is far younger than the language it presents. The characters are derived from the Sassanian Pahlavi, which was used to write down the oral tradition when the texts were collected and edited under the dynasty of the Sassanidæ. The writing is read from right to left. What the original Avestan script was we do not know.

Two dialects may be recognized in the Avesta; one, the 'Gāthā dialect,' or the language of the oldest parts of the Gāthās, or metrical sermons of Zoroaster; the other, 'younger Avestan,' or the 'classical dialect.' This latter is the language of the great body of the Avesta. The Gāthā dialect is more archaic, standing in the relation of the Vedic to the classical Sanskrit, or the Homeric Greek to the Attic. Possibly the Gāthā language may also owe some of its peculiarities noticed below to an original difference of locality. The Gāthā dialect was the speech of Zoroaster and his followers. Its grammatical structure is archaic and remarkably pure. The younger Avesta, in its very latest compositions, owing to decay, shows many corruptions and confusions in its inflections. All that is written in metre, however, is old and is generally correct and accurate. Inaccuracies that have crept in we must generally attribute to the carelessness of the scribes. In its forms, as a rule, the Avesta is extremely antique; in general it stands on the same plane as the Vedic Sanskrit, and occasionally, though not often, it shows even more ancient forms.

The language of the Avesta is most closely allied to the Sanskrit, though individually quite distinct from the latter. Together they may be classed as making up an old Indo-Iranian group. Almost any Sanskrit word may be changed at once into its Avestan equivalent, or vice versa, merely by applying certain phonetic laws. As an example may be taken the metrical stanza Ys. 10, 8, in the Avesta:

yō yaθā puθrəm taurunəm
haoməm vandaēta mašyō
frā ābyō tanubyō
haomō visāite baēšazai.

'Whosoever kindly welcomes Haoma, even as a tender stripling, to such person Hoama approaches bringing health'—becomes when rendered word for word in Sanskrit,

yō yáthā putráṃ táruṇaṃ
sōmaṃ vandēta mártyaḥ
prá ābhyas tanubhyaḥ
sōmō viśatē bhēṣajāya.

In its phonology the Avesta agrees with the Sanskrit in its vowels, but the Avesta shows a greater variety in its *e*- and *o*- sounds instead of *a*. Final vowels, except *ō*, are shortened as a rule. The Skt. diphthong *ē* appears in Av. as *aē*, *ōi*, *ē* (final; Skt. *ō* as Av. *ao əu*, *ō* (final). A striking peculiarity in Av. is the introduction of epenthetic vowels and help sounds, giving rise to improper diphthongs, *bavaiti*, 'he becomes'= Skt. *bhávati;* Av. *haurva-*, 'whole' = Skt. *sárva-;* Av. *vakhədhra-*, 'word'=Skt. *vaktra-;* Av.*hvarə;* 'sun'=Skt. *svàr*. The Skt. voiceless stops, *k*, *t*, *p*, generally become spirants, *kh*, *th*, *ph* (i.e. *x*, *θ*, *f*) in Av. before consonants. The original voiced aspirates *gh*, *dh*, *bh*, became in Av. simply voiced stops *g*, *b*, *d*. They are so preserved in the old Gāthā dialect; the younger dialect commonly resolves the latter before consonants and between vowels into spirants *y*, *s*, *w*. The sibilant *s* in Skt. initial becomes Av. *h*, as in Greek. Thus, Av. *hapta*, 'seven'=Skt., *saptá*. When internal, Skt. *s* may also appear as *ŋh*. Thus Av. *vaŋhana-*, 'vesture'=Skt. *vásana-*. Final *-as* of Skt. appears regularly as *-ō*. Thus Av. *aspō*, 'horse' = Skt. *áśvas*.

The Gāthā dialect regularly lengthens all final vowels. It frequently inserts the anaptyctic vowels: G Av., *fərā* Y Av., *frā*, 'forth'=Skt.. *pra*. Original *ns* appears as *ng;* G Av., *daēvəng* (acc. pl.), Y Av. *daēvān*, 'demons'=Skt. *dēvān*.

In inflection the Avesta shows nearly the richness of the Vedic Sanskrit. There are three genders—masculine, neuter, feminine; likewise three numbers, singular, dual, plural. The dual is not extensively used. There are eight well-developed cases of the noun and the adjective; the normal endings are: *Singular*, Nom., *s;* Acc., *-əm;* Instr., *-ā;* Dat. *ē;* Abl. *-aṭ;* Gen. *-ō* (*-as*); Loc. *-i;* Voc. ——. *Dual*, Nom., Acc., Voc. *-ā;* Instr., Dat., Abl. *-byā;* Gen. *ās;* Loc. *-ō*, *-yō*. *Plur.* Nom. Voc. *-ō* (*-as*), *-ā;* Acc. *-ō* (*-as*), *-ā;* Instr. *-bī;* Dat. *-byo* (*byas*); Gen. *ąm;* Loc. *-su*, *-hu*, *-sva*. The classes of declension agree exactly with the Sanskrit; the method of forming comparison of adjectives likewise corresponds. The numerals answer to Skt. forms, except Av. *aēva-*, 'one,' but Skt. *ēka-*, and Av. *baēvar*, '10,000,' but Skt. *ayúta*. The Av. pronouns closely resemble the Skt., but show also individual peculiarities. Noteworthy is the remote demonstrative Av. *ava*, *hāu*, 'that, yonder,' contrasted with Skt., *amú*, *asāu*. The verbal system in Av. and in Skt. is in general identical. The roots are chiefly monosyllabic and are subject to similar modifications in both. In voice, mode, and tense, and in their conjugation-system the two languages quite agree. The endings show equal antiquity with the Sanskrit. The primary active endings in Av. are: Sing. 1, *-mi*, 2, *-hi*, 3, *-ti;* Dual, 1, *-vahi*, 3, *-tō*, *-θō;* Plur. 1, *-mahi*, 2, *-tha*, 3, *-nti*. The Av. possesses like facility with the Skt. in forming words by means of prefixes, and by adding suffixes of primary and secondary derivation. The same classes or compounds may be recognized in both tongues. The rules of Sandhi, or joining together of words in a sentence, so universal in Skt., are almost wanting in Avestan. The Avesta separates every word; the vowels are fully expressed as in Greek, etc., by individual letters. No diacritical points or accents are written in the texts. The metres in which the Gāthās are composed have analogues in the Veda. Almost all the metrical parts of the younger Avesta are in 8-syllable lines. The syntax, however, differs in a number of points from the Sanskrit, and shows certain marked individualities, especially in the later portions.

The best information in general will be found in the contributions by various scholars in Geiger and Kuhn, *Grundriss der iranischen Philologie* (Strassburg, 1895-1902). A new and complete edition of the Avesta texts has been published by Geldner (Stuttgart, 1885-96). The first full editions were by Westergaard (Copenhagen, 1852-54), and by Spiegel (Vienna, 1853-58). The latter is complete only for the Avesta in its narrower sense (Ys. Vsp. Vd.), the Khordah Avesta being omitted; but it gives the Pahlavi version. —Translations: Best for reference is the translation by Darmesteter and Mills in the *Sacred Books of the East* (3 vols., Oxford, 1880, seq.), and especially the French version by Darmesteter, *Le Zend-Avesta* (Paris, 1893-94).—Lexicon and Grammars, F. Justi, *Handbuch der Zendsprache* (Leipzig, 1864); De Harlez, *Manuel de l'Avesta* (Paris, 1882); Kanga, *Avesta Dictionary* (Bombay, 1899); Bartholomæ, *Altiranisches Wörterbuch* (Strassburg, 1902); Schuyler, *Index of Avestan Fragments* (New York, 1902); Bartholomæ, *Grundriss der iranischen Philologie* (Strassburg, 1895); Jackson, *Avesta Grammar* (Stuttgart, 1891); Geldner, *Metrik* (Tübingen, 1877).—Literature and Antiquities, Anquetil-Duperron, *Zend-Avesta, Ouvrage de Zoroastre*, etc. (Paris, 1771); Haug, *Essays on the Parsis*, new edition, by E. W. West (London, 1884). See also the introduction of De Harlez, *Avesta* (Paris, 1881); F. Spiegel, *Eranische Altertumskunde* (Leipzig, 1871-78); Sanjana-Geiger, *Civilization of Eastern Iran* (London, 1886).

AVEYRON, ȧ'vā'rôɴ'. A department in the south of France, named after the river which traverses it from east to west (Map: France, J 7). It has an area of 3376 square miles, and is one of the most mountainous parts of France, being situated between the highlands of Auvergne and the Cévennes. The principal rivers, of which the Lot alone is navigable, flow through the department from east to west. The climate is healthful, but cold and raw, especially in the north and east. North of the Lot, only rye and oats are grown; in the west grape culture is carried on. Coal is mined at Aubin and Milau, and slate and marble are quarried. Population, in 1896, 386,393; in 1901, 377,559. Capital, Rodez.

AVEYRON. A river in the south of France, rising near Séverac-le-Château and flowing west across the Department of Aveyron. It receives the Viaur, and enters the Tarn below Montauban, in the Department of Tarn-et-Garonne. Entire length, 150 miles; navigable for the last 30.

AVEZAC DE CASTERA MACAYA, ȧ′v′-zȧk′ de kȧs′trȧ′ mȧ′kī′yȧ′, Marie Amand Pascal d′ (1800-75). A French geographer. He was born at Bagnères de Bigorre, and studied law, but after the appearance of his *Essais historiques sur le Bigorre* (2 vols., Bagnères, 1823), devoted himself entirely to geography. He was secretary of the Geographical Society of Paris from 1833 to 1835, and afterwards became president of that body, being five times reëlected to the office. The following are his principal works: *Etudes de géographie critique sur une partie de l'Afrique septentrionale* (1836); *Esquisse générale de l'Afrique* (1837); *Description et histoire de l'Afrique ancienne* (1845); *Les voyages d'Améric Vespuce* (1860); *Le livre de Fernand Colombe* (1873).

AVEZZANA, ä′vĕt-sä′nȧ, Giuseppe (1789-1879). An Italian patriot and politician, born at Chieri, in Piedmont. He was an officer in the Piedmontese Army, and for participation in the rising of 1821, was condemned to death, but escaped to Spain, where he fought for the Constitutional party. He was finally made prisoner by the French and deported to Cayenne. He succeeded in making his way to New Orleans and settled at Tampico, in Mexico, where he engaged in trade, and took part in the political strife of the times. He received from Santa Anna the command in the three eastern States. Coming to the United States in 1834, he married, engaged in mercantile business with great success, but returned to Italy at the outbreak of the Revolution, in 1848. He was minister of war of the short-lived Roman Republic, in 1849. After the taking of Rome he went to America. He joined Garibaldi in the Sicilian expedition, and was a radical deputy in the new Italian Parliament. At the time of his death he was the active leader of the Irredentists. He died at Rome, December 25, 1879.

AVEZZANO, ä′vĕt-sä′nō. A city in Southern Italy, 67 miles east of Rome (Map: Italy, H 5). It has a castle belonging to the Barberini, built by the Colonnas. In the office of the estate of Prince Torlonia is a collection of objects found in the Lago di Fucino, the draining of which was attempted in ancient times, but accomplished only in 1875. When the Marsi complained of its frequent overflow, Cæsar elaborated a plan for constructing a channel, 3½ miles long, through Mount Salviano to the Liris (or Garigliano), which, at Capistrello, is 80 feet below the bottom of the lake. At one point the channel was 300 feet underground. The plan was imperfectly executed under Claudius, and improvements were made under Trajan and Hadrian; but in the Middle Ages, Frederick II. tried in vain to reopen the blocked-up passage. Finally Prince Torlonia, after an expenditure of over $8,000,000, succeeded where his imperial predecessors had failed, and now a road 35 miles long runs around the 36,000 acres of reclaimed ground, which are cultivated in modern fashion. Population (commune), in 1881, 7380; in 1901, 9442.

A′VIA′NUS, Flavius. A Roman fabulist of the end of the Fourth Century A.D. He published a collection of forty-two Æsopic fables in rude elegiac verse. These were translated into English by Caxton, and published with his *Subtyl Historyes and Fables of Esope* (1483). There are editions by Lachmann (1845), and Ellis (1887). Consult L. Müller, *De Phædri et Aviani Fabulis* (Leipzig, 1875).

A′VIARY. A suitable inclosure, within which living birds may be kept, usually out of doors, in a state of comparative freedom. An aviary is really only a large bird-cage, and is often seen in warm countries, especially in southeastern Europe and Asia, and many exist in England. In the United States, however, the extremes of climate make an outdoor aviary impracticable for most private owners, and very few exist. Indoor rooms devoted to birds are in effect simply large bird-cages, and the care of such an aviary is essentially like that of a bird-cage; but care should be taken not to put together birds that are not inclined to dwell peaceably with the others. The largest aviary known is that in the park of the Zoölogical Society of New York. It is a wire cage, supported by a steel-pipe frame, in the form of a Gothic arch, situated among trees, several of which are growing within it; and it measures 153 feet long, 72 feet wide, and 55 feet high. It is the home of herons, game-birds, and similar large forms, together with many smaller species in summer. Similar smaller aviaries exist for other classes of birds in this, and in the zoölogical gardens of Europe and India, and by the natural conditions and freedom for exercise they afford, have enabled many species to be kept in health and beauty, which otherwise would hardly survive continual captivity, and certainly would not breed there as they constantly do in these huge cages. See Cage-Birds, and the books mentioned thereunder.

AVICEBRON, ä-vē′thȧ-brōn′, Salomon ben Gabirol (c.1020-c.1070). A Jewish poet and philosopher, born at Malaga and educated at Saragossa, where, in 1045, he published a treatise on the correction of customs. His *Fons Vitæ*, or *Sapientiæ*, written in Arabic, was known to the scholastics in the Latin translation of Gondisalvi, and affected the teaching of Erigena, Amaury de Bène, David de Dinan, Roger Bacon, and Giordano Bruno. Thomas Aquinas attacked him severely. Avicebron belonged to the Jewish school of Jehuda Halevi and Kalis la Sarde, and some of his poems are preserved in the Jewish liturgy. After an unhappy life of wandering, he died at Valencia, about 1070. Consult Guttmann, *Die Philosophie des Salomon ibn Gabirol* (Göttingen, 1889).

AV′ICEN′NA (Abu Ali Al Hossein ibn Abdallah ibn Sina) (980-c.1037). A great Arabic physician and philosopher. He was born at Efsene, a village in the neighborhood of Bokhara, in the month of Safar, in 980. His father held office under the Samanid ruler, Nuh ibn Manzur. Avicenna studied medicine and philosophy at Bokhara, and on account of a cure he received a post in court at the early age of seventeen. At his father's death, Avicenna went to Nasa, Tos, Dahistan, Gurgan, Rai, and Hamadan. At this latter place he gained the favor of Shems Addaula and was made vizier; but the opposition of the soldiery compelled him to relinquish this position. Under the successor of Shems Addaula, Taga Addaula, Avicenna was imprisioned in a fortress, but he managed to escape and fled to Ispahan. Here he spent the remainder of his days as court physician to Ala Addaula, whom he accompanied even on his military campaigns. Avicenna led a very arduous life. Although he traveled a great deal, he still found time to write. He died about 1037.

Avicenna is of importance, not only in the history of Arabic medicine and philosophy, but also in that of European philosophy. His great work, *Kanun fi'l Tibb*, a system of medicine, based on the Arabic translations of the Greek medical works, long held first place both in the Orient and Occident as a text-book in medicine. In the Orient it is still very highly regarded. The work is characterized by systematic classification, sometimes even running to excess. The Arabic text was published in 1593, at Rome, and again at Bulak. A Latin translation by Cremonensis appeared in Venice in 1595. In philosophy Avicenna teaches Aristotelianism, tinged, however, with Neo-Platonic ideas. He tries to reconcile philosophy and religion, a practice which is often met with in the later Arabic and Jewish philosophers. His metaphysics appeared in a Latin translation in 1493; his logic in 1495, Venice; 1556, Basle. For an extended bibliography consult Brockelmann, *Geschichte der arabischen Litteratur* (Weimar, 1899); Carra de Vaux, *Avicenne* (Paris, 1900).

AVICU'LIDÆ. A family of large, thin, pseudolamellibranchiate bivalve mollusks, typified by the genus Avicula, the wing-shells, so called because of their expansive method of growth. The family is numerous in all warm seas, and goes back to Devonian times. It includes the pearl-oysters (q.v.) and many queerly shaped forms, both fossil and recent, such as the hammer oysters and pinnas. See WING-SHELL and plate of ABALONE, ETC.

AVIE'NUS, RUFUS FESTUS. A Roman poet, who probably flourished about the close of the Fourth Century A.D. He is supposed to have been a native of Italy, and was probably a pagan. The works which have come down to us under his name are a Latin paraphrase, in hexameters, of the *Periegesis* of Dionysius, a translation of the *Phænomena* and *Prognostica* of Aratus, and a portion, amounting to 702 lines, of a poem called *Ora Maritima*. His style is superior to that of contemporary writers. The best edition of Avienus is that of Holder (Innsbruck, 1887).

AVIGLIANO, ä'vē-lyä'nō. A city in Southern Italy, on the Foggia-Potenza Railway, 65 miles south of Foggia (Map: Italy, K 7). It stands on a mountain, is surrounded by fir forests, and has marble quarries and mineral springs. Population, in 1881, 13,000; in 1901, 18,313.

AVIGNON, ȧ'vē'nyôN' (Lat. *Avenio*, either from *avena*, oats, or from Celt. *avon*, water, referring to the rivers surrounding it). A French town and the seat of an archbishopric in the Department of Vaucluse, of which it is the capital. It is situated on the left bank of the Rhône, on a lofty plateau, at a distance of 30 miles from the Mediterranean (Map: France, L 8). It presents a most striking appearance upon this wall-girdled height, on the summit of which rises the cathedral, and the impressive mass of the old Papal palace; but the streets, as in most walled towns, are crooked, narrow, and often steep; the houses mean and dirty. There are, however, two fine promenades and some pleasant squares in the city. The famous old bridge of Avignon still exists in part. The principal buildings are the venerable cathedral, Notre Dame des Doms, a grand and gloomy Romanesque structure, dating mainly from the time of the Crusades; the Popes' palace, with its six towers, used at present as barracks, a Gothic pile of the Fourteenth Century; the conservatory of music; the ancient archbishop's palace, now used as a seminary; the Musée Calvet, which contains Roman and other antiquities; and a picture gallery which is one of the best in the provinces. The public library contains 125,000 printed volumes and 4000 MSS., and 25,000 autographs. Avignon has a lyceum, two theological seminaries, the famous Académie de Vaucluse, and a botanical garden. The industries of the town comprise cotton-spinning, paper-making, manufacture of agricultural implements, tin, copper, and other hardware, hats and bonnets, velvet, taffeta, etc., and there is considerable trade in silk, wine, brandy, olive-oil, truffles, grain, and flour; in fact, Avignon is the central wheat-market of Provence. Population, in 1896, 32,100. Avignon was a flourishing city under the Romans. Early in the Middle Ages it was part of the Burgundian kingdom, upon whose dissolution it became a republic or commune, ruled by consuls. The city was the seat of the Papal court, from 1309, when Clement V. took up his residence there, until 1376, when Gregory XI. left it to make Rome once more the Papal metropolis. In the period immediately following, the antipopes, Clement VII. and Benedict XIII., made Avignon their residence. The city was the property of the Papal see from 1348 to 1791, when it was seized by France. Avignon is connected with the name of Petrarch, who first saw Laura there, in 1326. He lived there several years. Consult Müntz, "La cour pontificale d'Avignon," in Vol. XXII., *Revue des questions historiques* (Paris, 1899).

AVILA, ä'vē-lȧ. A town of Spain, capital of the Province of Avila and seat of a bishopric, in Old Castile, 53 miles northwest of Madrid (Map: Spain, C 2). It stands on the slope of the bleak Castilian hills, surrounded by gray granite walls and castellated towers in perfect preservation, and is one of the most remarkable inland fortress towns in Spain. The walls are 40 feet high and 13 feet thick. There are 86 towers and 9 gates. The city is built largely of granite. There is a cathedral, a military school, a seminary, a hospital, and royal woolen yarn factory. Population, in 1897, 11,700. In the Fourth Century, the city was called Abula. It is the birthplace of Saint Teresa, monastic reformer, and founder of the barefooted Carmelites. Consult: Mélida, "Avila: Iglesias ojivales," in Vol. CXXI., *La España moderna* (Madrid, 1899); Wilson, "Avila Cathedral," in Vol. LXXXIII., *The Churchman* (New York, 1901).

AVILA, Gil Gonzales de. See Dávila, Gil Gonzales.

AVILA Y ZÚÑIGA, ä′vė-lȧ ē thōō′nyė-gȧ, Luis de (c.1490-1552). A Spanish diplomatist and chronicler of the wars of Charles V., born at Placencia, in Estremadura. He seems to have stood high in favor with the Emperor, whom he accompanied on his expeditions to Africa and on his campaign against the Schmalkald League, and who intrusted him with embassies to the Popes Paul IV. and Pius IV. His *Comentarios de la guerra de Alemaña, hecha por Cárlos V. en 1546 y 1547*, is valuable as the record of an observant eye-witness; but the evident spirit of partiality in which it is written justifies the Emperor's own comment: "Alexander's achievements surpass mine, but he was less lucky in his chronicler." The latest edition is that of Madrid, 1852. The work has been translated into several languages.

AVILER, ȧ′vė′lȧ′, Augustin Charles d' (1653-1700). A French architect, born in Paris. He built the Porte-du-Peyrou, erected at Montpellier in honor of Louis XIV., and various structures at Béziers, Nîmes, Carcassonne, and the archiepiscopal palace at Toulouse. His principal book is the *Dictionnaire des termes de l'architecture civile et hydraulique*, which remained unpublished until 1738.

AVILÉS, ä′vė-lās′. A seaport of some importance in the Province of Oviedo, Spain. It is situated 19 miles north by west of the city of Oviedo, at the mouth of the chief branch of the Avilés, which is here crossed by a bridge, and is navigable at high water for vessels of the largest size. It has several good squares, handsome buildings, and gardens. In addition to the castle, the two churches, three monasteries, and a hospital, there is a naval academy. Pottery and weaving are the industries of the town. There are copper mines in the vicinity, and a considerable trade is carried on in articles of copper, as well as in coal, which is obtained not far from the town. Population, in 1897, 12,100.

AV′ISON, Charles (1710-70). An English composer. He was born at Newcastle, Eng., where, after having studied in Italy, he became organist in 1736. He wrote an *Essay on Musical Expression* (1752), in which he ranked the French and Italian composers above the Germans, and which created a considerable stir in the musical world of the time. He composed sets of concertos and sonatas which were very popular. He figures in Browning's *Parleyings with Certain People*.

AVI′TUS, Alcimus Ecdicius (?—c.525). A French ecclesiastic. He became bishop of Vienne in Burgundy, and was of very considerable prominence in the Church at that time. At a conference held in 499 between Arian and Roman theologians, he was the chief representative of the Romans, and by his influence there, together with his subsequent conversion of King Sigismund of Burgundy, did much to check the spread of Arianism in that kingdom and throughout Gaul. He also presided in 517 at the Synod of Epaone, which established forty canons in definition of the relations of the Church in Burgundy toward the civil power, and more especially toward heretics. Of his extant writings, comprising homilies, epistles, and poems, the most important is the didactic epic, *De Spiritalis Historiæ Gestis* (wrongly known as *De Mundi Principio*). His collected works were edited by Sirmond, *Bibliotheca Maximorum Patrum*, Vol. IX. (1643). Consult Binding, *Geschichte des Burgundischen Königreichs* (Leipzig, 1868).

AVIZ, ä′vėsh (named after Aviz, its original seat). An order of knighthood in Portugal, instituted by Alfonso I., in 1162, in imitation of the Order of Calvatrava, and having, like it, for its object the subjection of the Moors. From 1213 to 1385 it acknowledged the authority of the grand master of Calvatrava. In 1789 the Order was secularized and membership in it made a reward of merit. By the present usage, the King of Portugal, who is Grand Master of all orders, wears the decorations of the first three orders of Portugal—those of Christ, Saint James, and Aviz—united in one medal. The order was extended to Brazil in 1823.

AVLONA, ȧv-lō′nȧ (the ancient Greek *Αὐλών*, *Aulōn*), or Valo′na. A seaport in Albania, European Turkey, in the Vilayet of Janina, on the Gulf of Avlona (Map: Turkey in Europe, B 4). It has a safe and spacious harbor and considerable trade in oil, wool, grain, and turtles. The inhabitants manufacture arms and engage in fishing. The population numbers about 6000.

AVOCADO, ăv′ô-kä′dô, *Sp. pron.* ä′vô-kä′ᴅô (from Mex. *ahuocatl*) **PEAR**, or Alligator Pear (*Persea gratissima*). One of a genus of plants of the order Laurineæ, comprising one hundred species or more, all natives of sub-tropical Asia or America. It is a native of the West Indies and Central America, and is the only species of this order cultivated for its fruit. The flowers are green, about half an inch across; the fruit is pyriform, about four inches long, yellow or brownish purple. The leaves are elliptical, narrow toward the base, about six inches long. The flesh of the fruit is soft and its flavor somewhat resembles that of butter. It is eaten with wine or spices. It finds a ready sale in the large cities of the United States. Its cultivation in this country is chiefly confined to the southern part of Florida and to southern California. For illustration, see Alligator Pear on Abutilon plate.

AV′OCET. See Avoset.

AVOGADRO, ä′vô-gä′drô, Amadeo, Conte di Quadregna (1776-1856). An Italian physicist. He was born at Turin and became professor of physics there in 1820. He was the author of a large number of scientific memoirs, and first published his celebrated rule in the *Journal de Physique*, in a paper entitled: "Essai d'une manière de déterminer les masses relatives des molécules élémentaires des corps, et les proportions selon lesquelles elles entrent dans les combinaisons." See Avogadro's Rule.

AVOGADRO'S RULE. One of the fundamental principles of chemistry. It is usually formulated as follows: Under the same conditions of temperature and pressure equal volumes of gases and vapors contain equal numbers of molecules. It may appear strange, at first sight, that an idea of this nature should be incorporated in the very foundation of an exact science like chemistry. For the very conception of matter as made up of molecules is nothing but an hypothesis: and even if this conception is correct, the number of particles in a given mass of matter could of course never be actually counted. The following considerations, however, will show at once the real significance of Avogadro's rule. An immediate consequence of the rule is, that comparing equal volumes of substances in the gaseous state, as to weight, composition, etc., is the same as comparing single molecules. Following the rule, chemists have therefore adopted as the standard quantity for investigation, not a unit of weight, but a unit of volume, and have for many years now been comparing, not equal weights of substances, but equal volumes. Now, this practice has led to the acquirement of a stupendous amount of purely empirical information that forms a solid part of the science of chemistry, the original rule merely explaining *why* comparing equal volumes should lead to so many excellent results. If, therefore, the atomic hypothesis should sometime be discarded as no longer necessary, the hypothetical form of Avogadro's rule would of course go with it; but its corollary, the expediency of comparing equal volumes of substances, would still remain a great guiding rule in the science of chemistry.

The rule was originally proposed as an addition to the atomic theory, the purpose being to account for a remarkable general fact then recently discovered by Gay Lussac; viz., that when two gases react with each other chemically, their reacting volumes bear to each other a ratio that can be expressed by small integral numbers. Thus, when hydrogen and chlorine unite to form hydrochloric acid, the volumes of the reacting gases are equal, i.e. their ratio is $1 \div 1$. Similarly, equal volumes of hydrochloric acid gas and ammonia combine to form sal-ammoniac; i.e. the ratio is again $1 \div 1$. In the formation of water from hydrogen and oxygen, these two gases unite in the simple ratio of $2 \div 1$. Gay Lussac's law holds equally good in the case of gaseous products of chemical decomposition and with regard to the ratios of the volume of a gaseous compound to the volumes of its gaseous chemical components. Thus, 3 volumes of hydrogen and 1 volume of nitrogen are produced by the decomposition of 2 volumes of ammonia. This law, examined from the standpoint of the atomic hypothesis, indicates that some very simple relation must exist between the numbers of particles contained in the reacting volumes of gases. For according to that hypothesis all chemical reactions of substances take place really between their particles. The simplest relation that suggests itself to the mind is expressed by Avogadro's rule; viz., that equal volumes of gases contain equal numbers of molecules. If, then, the reacting volumes of hydrogen and chlorine are equal, it is because every single molecule of chlorine reacts with one single molecule of hydrogen. Although it thus formed a plausible explanation of Gay Lussac's law, the idea, when first advanced by Avogadro in 1811 and resuggested by Ampère in 1814, was not accepted by the scientific world. The scanty stock of experimental knowledge of the time did not warrant the incorporation in science of a general theoretical principle of this nature.

The practical importance of the rule is mainly in the fact that it permits of ascertaining the relative weights of molecules ('molecular weights'), these weights being represented, according to the rule, by the relative weights of equal volumes of substance in the gaseous state. The substance with which all other substances are usually compared is hydrogen, to which chemists assign the molecular weight 2, since its molecule is supposed to consist of two atoms of unit atomic weight (the unit is of course arbitrary and is chosen merely for convenience sake). Comparing equal volumes of hydrogen and oxygen, the latter is found to weigh 16 times as much as the former. The molecular weight of oxygen is, therefore, in accordance with Avogadro's Rule, said to be 32. In a similar manner the molecular weight of any other substance in the gaseous state may be ascertained by multiplying the density (i.e. its relative weight with respect to hydrogen) by 2. Thus, the density of ammonia gas being about 8.5, its molecular weight is 17; the density of hydrochloric acid gas being about 18.25, its molecular weight is 36.5, etc.

Now, equal volumes of ammonia gas and hydrochloric acid combine to form ammonium chloride (sal-ammoniac, NH_4Cl) and nothing else. Both the chlorine of hydrochloric acid and the nitrogen of ammonia represent the smallest relative weights of those elements found in any compound; or, in the language of the atomic theory, hydrochloric acid contains only one atom of chlorine, and ammonia only one atom of nitrogen. Hence, one entire molecule of hydrochloric acid (molecular weight $= 36.5$) and one entire molecule of ammonia (molecular weight $= 17$) must be combined in one molecule of ammonium chloride; for otherwise the latter compound could not, as it does, contain both chlorine and nitrogen. Consequently, the molecular weight of ammonium chloride could not possibly be less than $17 + 36.5 = 53.5$, and hence its density could not, according to Avogadro's rule, be less than $53.5 \div 2 = 26.75$. When, however, ammonium chloride is heated and its vapor studied experimentally, the density is found to be only about one-half as great. This fact was for a long time regarded as proving that Avogadro's rule is incapable of general application, although in most other cases the molecular weights obtained with the aid of the rule were found to agree thoroughly with the chemical behavior of the compounds. But even in the case of ammonium chloride, the exception was finally shown to be only apparent. Pebal and Than, namely, demonstrated that when ammonium chloride is evaporated, it breaks up into its constituents, ammonia gas and hydrochloric acid, the dissociation naturally causing an increase of volume, and hence a decrease of density. As long as the products remain mixed in a vessel, or are allowed to escape together, it is impossible to prove directly that the vapor is a mixture of ammonia and acid, the reaction with litmus paper being of course neutral. But Pebal and Than proceeded as follows: They divided a glass tube into two parts by a porous partition and heated a lump of ammonium chloride in one part of the tube; the ammonia gas produced, diffusing through the partition more rapidly than the hydrochloric acid, soon filled the other part of the tube and showed the ordinary alkaline reaction with red litmus paper (i.e. turned it blue). The case of ammonium chloride thus changed from an exception into an additional indication of the correctness of Avogadro's rule.

The principal arguments in favor of the rule may be briefly summed up as follows:

(1) Avogadro's rule furnishes the chief method of ascertaining the atomic weights of the chemical elements, and there are very strong reasons for believing that the atomic weights thus obtained represent the true numbers characterizing the elements. See PERIODIC LAW.

(2) The modern theories of the chemical constitution of compounds could not have come into existence and could not be applied in individual cases, if the molecular and atomic weights to which the rule leads were unknown. Avogadro's rule is at the very foundation of those theories; and hence, conversely, the correctness of the theories, as indicated by the numerous triumphs achieved by them for both pure and applied chemistry, is to be considered as strong proof in favor of the fundamental rule.

(3) The strongest argument in favor of Avogadro's rule in its hypothetical form, lies in the fact that it follows, by mathematical deduction, from the kinetic theory of gases. (See GASES, PROPERTIES OF.) The correctness of this theory, on the other hand, is strongly indicated by the fact that it also leads to those laws of gases which have long been established experimentally.

Avogadro's rule can evidently hold good only in those cases in which the gases or vapors in question behave very nearly in accordance with the laws characteristic of matter in the perfectly gaseous state; i.e. if at constant temperature the volume varies inversely as the pressure, and if under constant pressure the volume varies as the absolute temperature. For if, under equal pressures and temperatures different gases did not always occupy equal volumes, then equal volumes could not always contain equal numbers of molecules.

The rule is sometimes spoken of as the law of Avogadro and Gerhardt, the latter chemist having done much toward establishing it on a firm scientific basis. Gerhardt's pupil, Cannizzaro, continued his researches, and finally succeeded in demonstrating to the scientific world its great importance. In 1886 Van't Hoff showed the rule to be applicable not only to gases and vapors, but also to substances in solution, and as a consequence, the rule is also often referred to, especially by German authors, as the rule of Avogadro-Van't Hoff. Consult: Avogadro's original memoir on the molecular theory, German trans., *Ostwald's Klassiker der exakten Wissenschaften*, No. 8; and Cannizzaro, "Abriss eines Lehrganges der theoretischen Chemie," *Ostwald's Klassiker*, No. 30. See also ATOMIC WEIGHTS; MOLECULES—MOLECULAR WEIGHTS; SOLUTION; CHEMISTRY.

AVOID′ANCE. See BENEFICE.

AVOIRDUPOIS, ăv′ēr-dū-poiz′, or **AVERDUPOIS′** (ME. *aver de peis*, OF. *aveir de peis*, equivalent to ML. *averia ponderis*, goods of weight). The name given to the system of weights and measures applied in Great Britain and America to all goods except the precious metals and precious stones.

The grain is the foundation of the avoirdupois system, as well as of the troy. A cubic inch of water weighs 252.458 grains. Of the grains so determined, 7000 make a pound avoirdupois, and 5760 a pound troy. (See WEIGHTS AND MEASURES.) The avoirdupois pound is divided into 16 ounces and the ounce into 16 drams. A dram, therefore, contains 27 11-32 grains, and an ounce 437½ grains.

TABLE OF AVOIRDUPOIS WEIGHT.

27.34375 grains...	are	1 dram.	
16 drams or drachms...	"	1 ounce	=437½ grains.
16 ounces..........	"	1 pound	=256 drams=7000 grains.
28 pounds.........	"	1 quarter	=448 ounces.
4 quarters........	"	1 hundredw't	=112 pounds.
20 hundredw't...	"	1 ton	=80 q'rs=2240 pounds.

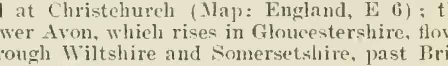
A cubic foot of water weighs 997.14 ounces avoirdupois, or nearly 1000 ounces, which gives an easy rule for determining the weight of a cubic foot of any substance from its specific gravity. Avoirdupois is the weight used in the United States, where, however, in most places, the hundredweight contains only 100 pounds, and the ton, 2000 pounds.

AVOLA, ä′vō-lä. A city in Sicily, 20 miles southwest of Syracuse. The surrounding country produces almonds and raw sugar, and the chief industries of the town are sugar-refining and the manufacture of straw matting. Population, in 1881 (commune), 12,478; in 1901, 16,264.

AVON, ā′von (Celt. *avon*, Welsh *afon*, Gæl. *abhain*, *abhuinn*, water, river, probably akin to Lat. *aqua*, water). A name borne by several rivers in England and Scotland. The more important of them are: the Upper Avon, which rises in Northamptonshire, and flows southwest through Warwickshire, entering the Severn at the northern boundary of Gloucestershire, after a course of 96 miles, passing Stratford, the birthplace of Shakespeare (Map: England, D 4); the East Avon, which rises in Wiltshire and flows in a southerly direction, entering the English Channel at Christchurch (Map: England, E 6); the Lower Avon, which rises in Gloucestershire, flows through Wiltshire and Somersetshire, past Bristol, and enters the Bristol Channel, after a course of 62 miles.

AVON. A village in Livingston County, N. Y., 18 miles south by west of Rochester, on the Erie Railroad and the Genesee River. It is noted for its mineral springs, which have medicinal properties. Population, in 1900, 1601.

AV′OSET, or **AVOCET** (Fr. *avocette*, Sp. *avoceta*, of unknown origin). A limicoline bird, nearly related to the stilts and snipes, about 17 inches in length, and having long wading-legs, webbed feet, and a remarkably long, slender, and upcurved bill. It frequents marshes and the edges of pools, and searches the shallow water with its sensitive beak for crustaceans, snails, and similar small prey creeping over the mud. Various species dwell in summer in the temperate parts of both the Old and the New World, migrating to the tropics in winter. They form a poor nest upon the ground in marshy places, and lay four olive or buff eggs, thickly spotted with dark brown. The principal American species,



BEAK OF AN AVOSET.

(*Recurvirostra Americana*) has whitish plumage, with the wings black, and the head, neck, and breast light cinnamon. It is common in the Western States, and shot as game. Consult Coues, *Birds of the Northwest* (Washington, 1874).

AVOW′RY (OF. *avouerie*, from *avouer*, to avow, from Lat. *ad*, to + *vocare*, to call). The technical name of the pleading interposed by the defendant to the plaintiff's declaration, or complaint, in an action of replevin (q.v.). By this plea the defendant avowed or acknowledged his seizure of the chattels claimed by the plaintiff and justified the act by setting up the facts upon which he relied to show that he was entitled to make the seizure complained of. Under modern practice the action of replevin has largely lost its technical character, and its procedure has become assimilated to that of the more common and simple forms of action; but the plea of the defendant under whatever name, retains substantially the character of the avowry. Consult the authorities referred to under the title Pleading.

AVRANCHES, ȧ′vräNsh′ (anciently, *Abrinca*, capital of the *Abrincatui*, a nation of Gaul). A town in the Department of La Manche, France, near the left bank of the Sée, 33 miles east of Saint Malo (Map: France, E 3). It is beautifully situated on a high hill, which extends in a long ridge and is ascended by zigzag roads built on terraces. This hill commands a very wide and beautiful view of a finely wooded and cultivated district, with a winding river which attracts summer visitors in great numbers. There is a botanical garden at Avranches, and a public library containing among other things several ancient manuscripts. There are considerable manufactures of lace, calico, and cloth, as well as tanneries, machine-shops, and breweries. Population, in 1896, 7600. Avranches was formerly a bishop's see, and its cathedral was one of the most magnificent in Normandy. It was destroyed in 1793. A stone, still preserved on the site of the cathedral, is said to be that on which Henry II. of England kneeled before the papal legate to receive absolution for the murder of Thomas à Becket. It was a place of importance during the Roman period, and some of the old Roman ramparts are still standing. It was afterwards a frequent object and scene of strife during the wars between the French and the English. Consult Le Héricher, *Avranchin monumental et historique* (Avranches, 1845-46).

AVUL′SION (Lat. *avulsio*, a tearing off, Fr. a, from + *vellere*, to tear away). The sudden transfer by natural forces of a portion of one man's land to the soil of another. The term is applied as well to the result of a sudden change in the course of a boundary river, the reliction or encroachment of the sea, as to an actual tearing away of a portion of A's land and its deposit upon or against the land of B, as the result of a flood. The title to the soil so carried away or transferred is not affected by the physical change in its situation, and the owner is entitled to recover the possession thereof from the person to whose soil it has become annexed. In this respect it differs from accretion or a gradual and imperceptible addition to the land of a riparian proprietor by the action of the water. (See Accretion.) Thus, if the sea permanently recedes so rapidly that the reliction of the water is perceptible in its progress, the case is one of avulsion, and the land exposed continues to be the property of the State, as when it was still covered by the sea. This rule may be varied by custom, however, as in the case of the river Severn, below Gloucester Bridge, which (says Lord Hale) "is the common boundary of the manors of either side, what course soever the river takes," and is the case of the Missouri River, as to which a similar doctrine has been laid down by the United States Supreme Court, to cover the effect of the rapid current of the river upon the loose soil composing its banks (Nebraska *v.* Iowa, 143 U. S. 359). Even here, however, the court is careful to distinguish the case of the cutting of the new channel above Omaha in 1873, which is described as an avulsion and as leaving the land titles on either side up the stream unaffected. See Alluvion; Riparian Rights; Rivers; Sea Shore.

AWAJI, ȧ-wä′jē. The largest island in the Inland Sea of Japan, situated in its eastern part, and pertaining to Hiogo Ken. It is 34 miles long, contains 218 square miles, and has a population of 170,000. In mythology Awaji was the first island created by Izanagi and Izanami; the name, in legend, meaning 'my shame,' but actually 'the way of Awa.'

AWANTIBO, ä′wȧn-tē′bȯ, or **ANGWANTIBO**, ä*n*′gwȧn-tē′bȯ (native name in West Central Africa). A small light-brown lemur (*Perodicicus calabarensis*), allied to the pottos, and distinguished by the absence of any visible tail, and by the rudimentary condition of the index finger of the hand, while the thumbs on all the feet are greatly enlarged and separated from the fingers, forming of the feet powerful grasping organs. The animal is rare, and its habits are little known.

AWARD′ (OF. *eswarder*, look at, consider, decide, from *es* (Lat. *ex*) + *warder*, observe, guard, from OHG. *warten*, to watch). The formal adjudication of a matter in dispute by arbitration or referees to whom it has been referred. An arbitration being an extra-judicial proceeding, the award does not have the force of a judgment; but it may, if made by official or judicial referees, be the basis of a judgment, and, if made by private arbitration, it becomes legally binding upon the parties thereto. The submission to arbitration involves an agreement to abide by the result thereof, and thus the award becomes a term of the contract, enforceable as such. In order to be binding, however, it must be consonant with the submission; must be limited to the parties agreeing thereto, and to the matters in dispute, and must be final, certain, and specific. See Arbitration.

AWATA, ȧ-wä′ta. A village in the suburbs of Kioto, Japan, famous for its yellow faïence. Awata pottery was invented in the Seventh Century, is decorated, and by the Japanese is called 'Tamago Yaki' (egg-ware). It is largely exported to the United States.

AWE, a̤, Loch (Gael. *abh*, water). A lake in the centre of Argyllshire, Scotland, 23 miles long, and one mile broad (Map: Scotland, C 3). Its surroundings are very picturesque, and in some parts even striking. It is covered with numerous wooded islands, and its northern end is shadowed by a rocky mountain chain over 3000 feet high.

It is drained by the river Awe, which enters the Loch Etive. Its largest feeder is the Orchy, from the northeast. There are numerous castles on several islands in the Loch, some of them dating from the Thirteenth Century. The Loch is traversed by steamers, and there is a railway station on its northern shore.

AWN. See Gramineæ; and Grasses.

AWOMORI, ä'wô-mō'rê. See Aomaori.

AXAYACATL, ä'chȧ-yȧ-kä't'l (Mex., 'Face-in-the-water') (?-1477). An Aztec chief, styled in contemporary narratives, Emperor of Mexico. He is reported to have been the father of Montezuma, whom Cortes conquered. About 1467 he led his Aztecs to the conquest of Tehuantepec, and afterwards crushed a rebellion that threatened his capital, the City of Mexico. He died suddenly, about 1477. Half a century later the soldiers of Cortes occupied Axayacatl's 'palace,' which was the large communal dwelling of the section of the tribe to which Axayacatl belonged. In one of the rooms they found an immense treasure of gold and silver in ore and bars, with jewels, and many curious articles of manufacture.

AXE (Ger. *Ax*, *Axt*, Lat. *ascia*, Gk. *ἀξίνη*, *axinē*). An instrument used for felling trees and chopping wood. The axe is one of the earliest tools used by man, being found among the relics of the Stone, Bronze, and Iron ages. It was fashioned sometimes of syenite or black sandstone, as by the lake dwellers of Europe; of jade, as by ancient peoples of Asia and Asia Minor and by the modern Maoris; of flint or bone, as by the American Indians; of mixed copper and tin, as by the Romans, ancient Mexicans, and South Americans; of copper, as by the Druids. To this day stone axes are used in some of the South Sea Islands. The American axe, the best of modern make, usually consists of a head or butt of wrought iron, heated to a white heat, cut to the desired length, and then, after the eye for the handle is punched through, reheated and pressed between concave dies into proper shape. Again heated, it is grooved on the edge; with borax as a flux, the arched edge-piece of steel is inserted, projecting an inch or more; the iron and steel are then welded at white heat, and after it is hammered, ground to a fine edge, tempered and polished, the head is varnished to prevent rust. Forms and weights vary according to the use to which the tool is to be put. For very hard timber, the edge is narrow and the whole axe heavy. Common forest axes weigh from 3 to 7 pounds. The handle is generally made of hickory, which is not only strong, but elastic. The pickaxe, used for breaking up hard ground, is not an axe in any sense, but rather a hammer. The hatchet (Fr. *hachette*, a little axe) is for use with one hand only. The 'francisca,' at one time the national weapon of the Franks, was a hatchet for throwing, and the tomahawk (q.v.) of the North American Indians was, as is well known, used in a similar manner and in hand-to-hand combat. The adze, a tool used for the chipping or rough planing of horizontal surfaces by carpenters, has its blade at right angles to the handle, and so curved that the plane of the cutting edge, as the instrument is swung into contact, is horizontal. Broad axes, formerly much used for hewing logs into square timbers, are axes with very broad blades, and the cutting edge much less curved than the edge of the regular axe for chopping.

AX'EL, or Absalon (1128-1201). Archbishop of Lund, after 1178, and minister and general of Waldemar I. and Canute VI. of Denmark. He was descended from a distinguished Danish family, and in his youth studied at Paris. Axel distinguished himself by wisdom, uprightness, and valor. He drove the Wendish pirates from the Danish coast, attacked them in their own settlements on the island of Rügen, and annexed the island to Denmark. He defeated the Pomeranian prince, Bogislav, in 1184, and made him dependent on Denmark. In the wise legislation of Waldemar and of his son, he had a great part. He promoted learning and art, and to his encouragement we owe the first connected history of Denmark by Saxo Grammaticus. In building a fortified castle for defense against the pirates, he laid the foundation of the future city of Copenhagen, then an insignificant village inhabited only by fishermen. Owing to this origin, Copenhagen has sometimes been called Axelstadt. Axel lies buried in the Church of Sorö, where he founded a monastery.

AXHOLME, ăks'ȯlm, or Axelholm (AS. *holm*, island in a river; Engl. *holm*, hill; islet). An island in the northwest of Lincolnshire, England, formed by the rivers Trent, Don, Idle, and Vicardyke (Map: England, F 3). Area 47,000 acres. It incloses various parishes, of which Epworth is the chief. Abundant crops are raised by small landowners. Formerly a marsh which succeeded an ancient forest, it was reclaimed in 1634, after five years' labor by Vermuyden, a Dutchman, under contract from Charles I. The land became very fertile under Dutch and French Protestant immigrants, which fact antagonized the local peasantry. Litigation ensued, which ended in 1691, by the natives receiving 10,532 acres and the settlers 2868. The accent and physical characteristics of the settlers exist in the present inhabitants. Consult: Peck, *Isle of Axholme* (1815); Peacock, in *Anthropological Review* (1870).

AX'IL. See Leaf.

AX'ILLARY THERMOM'ETER (Lat. *axilla*, armpit). A thermometer placed in the armpit, and sometimes in the mouth, vagina, or rectum, to ascertain the temperature of the body. The arm must be held close against the body to make a closed cavity of the axilla when the thermometer is in use. Modern clinical thermometers are self-registering; the column of mercury being divided by a bubble of air so that an upper portion, about one centimetre in length, is carried up the tube by heat, and left when the main portion of the mercury descends again. The methodical use of the thermometer in febrile conditions dates from 1851.

AXIM, ȧ-shēng' *or* ăks'ĭm. A seaport in the British colony of Gold Coast, situated about 70 miles west of Cape Coast Castle. Its harbor, built by the Portuguese, is the best on the Gold Coast. In 1642 it was taken from the Portuguese by the Dutch, who in 1872 ceded it, with the whole of their possessions in Guinea, to the English.

AX'INITE (Gk. *ἀξίνη*, *axinē*, ax: refers to its edged crystals). An aluminum and calcium borosilicate, with varying amounts of iron and manganese, which crystallizes in the triclinic system. It is found in the form of brown crystals, edged like an axe, in various localities in

Europe, notably Dauphiné, France, and Scopi, Switzerland, where the crystals are cut into beautiful brown gems. It has been found in the United States near Bethlehem, Pa., and in Maine, but in crystals that are too small for cutting.

AXIN'OMAN'CY (Gk. *ἀξίνη*, *axinē*, axe + *μαντεία*, *manteia*, divination). A kind of divination practiced in ancient times by means of an axe. The ancients tell us nothing with regard to its method or its use. See Superstition.

AX'IOM (Gk. *ἀξίωμα*, *axiōma*, that which is thought worthy, fit, self-evident). A general statement, the truth of which is accepted without proof. Plato probably limited it to geometric propositions, but Aristotle applied it to statements of a more general nature. Euclid followed Aristotle's use of the term, regarding axioms as 'common notions' not limited to geometry, and applying the term *postulate* to a premise specifically geometric in character. The early English translators of Euclid failed to consult the most trustworthy sources, and hence the terms *axiom* and *postulate* have come to be confused. Heiberg, the latest and best editor of the *Elements*, has made clear the distinction which Euclid recognized, and has shown that he gave five axioms and five postulates. Euclid regarded as an axiom that, "If equals be added to equals, the sums are equal;" as a postulate that (stated in simpler language than his), "Through a given point only one line can be drawn parallel to a given line." The first statement is general, the second is specifically geometric. Mathematicians formerly sought to limit the list of axioms and postulates to the smallest number upon which the subject in question, as geometry, could be built; the modern tendency is rather to seek a list, however extended, of the really independent properties of space. To the followers of Kant seems due the common definition of axiom as 'a self-evident truth,' a definition no longer recognized as valid. See A Priori and Geometry.

AX'IS (Lat. *axis*, axle). In mathematics, a line of reference called by various names, according to its different uses. In geometry, a line which bisects at right angles the lines joining corresponding points in symmetric systems is called an *axis of symmetry;* e.g. the altitude of an isosceles triangle. An *axis of a geometric solid* is a diameter about which the points of the solid are symmetrically distributed; e.g. the diameters of spheres and ellipsoids. *Axes of coördinates* are the lines of reference from which the coördinates are measured. (See Analytic Geometry.) The *radical axis* of two circles is the line joining their points of intersection; the line is real, even when the circles cut in imaginary points. The *transverse axis* of a conic is the diameter which passes through the foci. The *conjugate axis* is the line through the origin perpendicular to the transverse axis.

In physics, the *optic axis* of a lens is the straight line passing through its optical centre and perpendicular to its surfaces. The *axis of a telescope* is the straight line joining the centres of its lenses (objective and ocular). The *axis of rotation* is a straight line which remains at rest while a body rotates around it, as the line joining the poles of the earth.

AXIS (Lat., of unknown origin). A species of deer (*Cervus axis*) abundant throughout India and in many islands of the Eastern Archipelago. One of its Indian names is *chittra*, and by British sportsmen in India it is generally called the spotted hog-deer. It was known to the ancients as *axis*. The axis resembles in size and color the European fallow-deer; it is generally of a rich fawn color, beautifully spotted with white, nearly black along the back, the under parts snow-white. The horns are slender, sharp-pointed, little branched, and not at all palmated. The female has no horns. The axis frequents thick jungles in the vicinity of water, and feeds during the night. It is commonly found in herds of 15 or 20, of which three or four are males. Its sense of smell is remarkably acute, and it is generally very shy and timid, so that sportsmen find it difficult to get within shot. The male, however, sometimes exhibits great courage in defense of the young. It is very easily domesticated, is gentle in its manners, and breeds freely in captivity, so that it is commonly seen in zoölogical parks. See colored plate of Deer.

In architecture, axis is either the temporary central line used in making drawings or the imaginary central line of a building. Sometimes buildings have a curved axis, sometimes several have a common axis. The relation of the axis of neighboring monumental structures has always been a matter of careful study in architectural history.

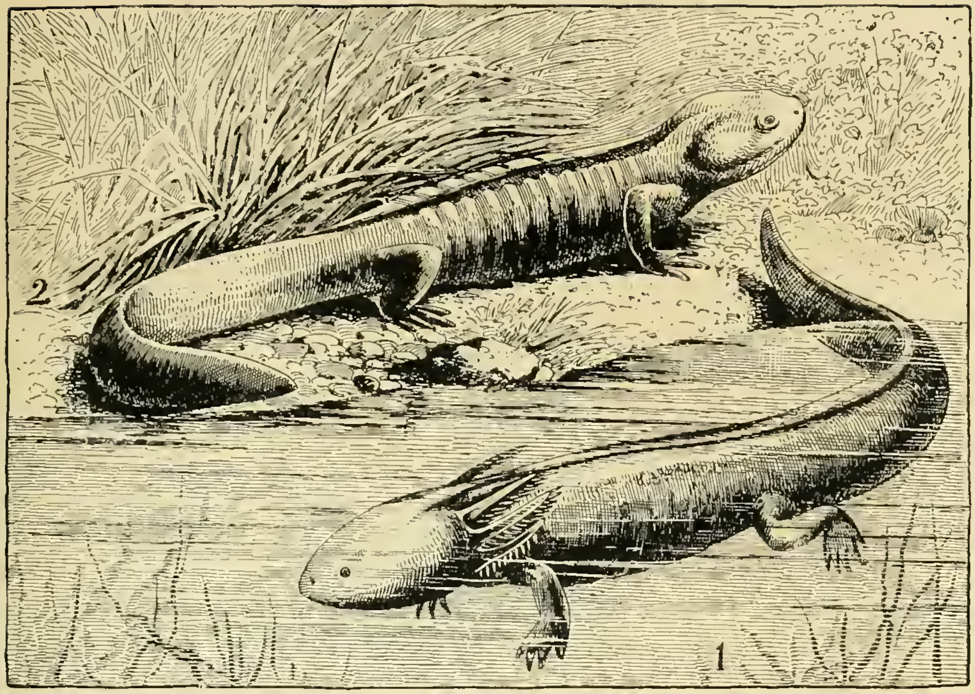
AXIS in Botany. See Stem.

AX'LE (Ger. *Achse*[*l*], dim. of form found in Lat. *axis*). The bar of metal or wood which carries the wheel or wheels of vehicles or of machinery, and around which the wheel or wheels revolve, sometimes with the axle and sometimes upon it. Axles for wagons are made of iron or wood and are fixed, the wheels revolving around them. Axles of railway cars have the wheels keyed to them and revolve with the wheels, the ends of the axle projecting outside of the wheels, and turning in journal-boxes on which the body of the car rests. Railway axles are forged from steel of high quality and have the wheels forced upon a taper wheel-fit by hydraulic pressure. The projecting ends or journals are turned and finished smooth. Standard dimensions of axles for cars of different weights have been adopted in the United States by the American Master Car Builders' Association. See Shafting.

AX'MINSTER (AS. *Axan Mynster*, minster of the [river] Axe). A market-town in Devonshire, England, on the Axe, 24 miles east-northeast of Exeter. Axminster was once famous for the manufacture of a superior grade of carpets (Map: England, D 6). Population, in 1891, 4000; in 1901, 4100.

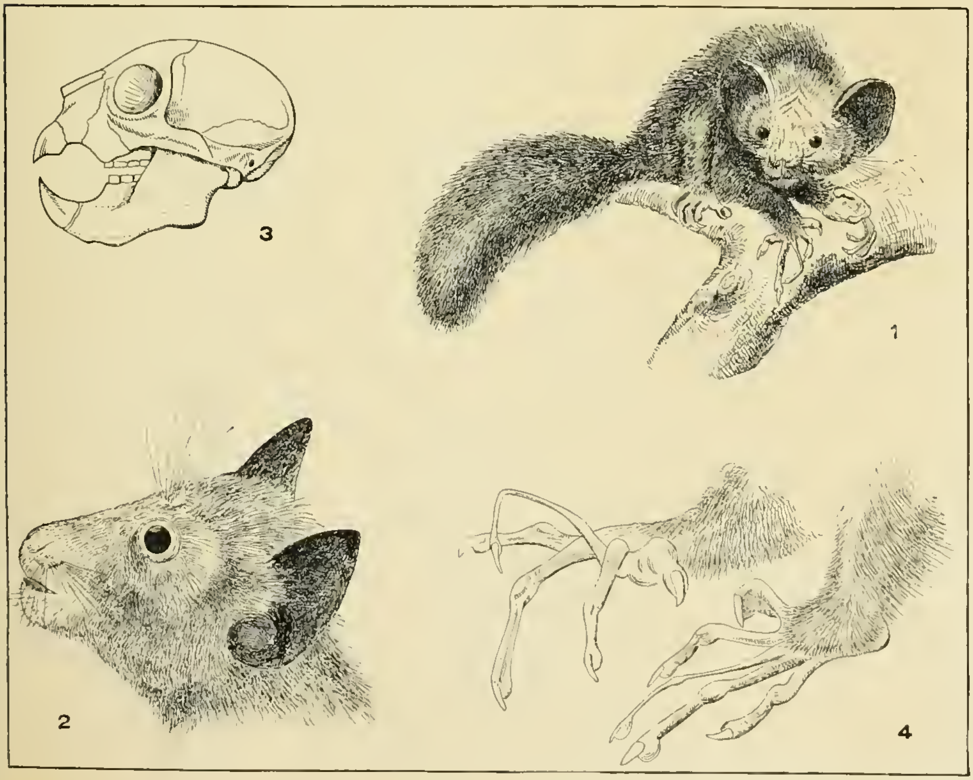
AXOLOTL, ăks'ô-lŏt'l (Mex.). Any of several species of larval salamanders of the genus Amblystoma. They inhabit certain lakes of Mexico and the Rocky Mountain region of the United States. Its eggs resemble frogs' eggs, being laid in strings formed by a viscous covering, and attached to water-plants. They hatch in from two to three weeks. The young axolotl has external bushy gills, much like those that are retained throughout life by the mud-puppy (q.v.). It may become sexually mature while still bearing the external gills, and before its life-history was known it had been given the name Siredon lichenoides. The passage of the axolotl into an Amblystoma first became known to science in 1865,

AXOLOTL



1. LARVAL AXOLOTL (Amblystoma Mexicanum).
2. ADULT FORM.

AYE-AYE



1. AYE-AYE (Chiromys Madagascariensis).
2. HEAD IN PROFILE (enlarged).
3. SKULL.
4. RIGHT AND LEFT HANDS, showing wasted digits.

and has since been confirmed. Perpetual submergence or a permanently dry saline shore prevents the transformation in nature, while it is favored by an alternation of wet and dry conditions, such as are found on a wave-washed shore or in slowly drying lakes or ponds. The Colorado form (*Axolotl tigrinum*) delays its metamorphosis for a long time, but it always occurs eventually in nature, while the black Mexican (*Axolotl maculatum*), which is much prized as food by the natives, has never been known to make the change.

AX′STONE. A variety of nephrite of greenish color, which is hard, tough, and more or less translucent. It is found in primitive rocks in Saxony, Greenland, New Zealand, and other South Pacific islands, and is used by the natives for making hatchets, whence its name. The variety found on the banks of the Amazon River, in South America, has been called *Amazonian stone*.

AXUM, åk-sōōm′ (Gk. ῎Αξουμις, ῎Αυξωμις, *axoumis*, *auxōmis*, Lat. *auxumis*). Once the capital of the Ethiopian kingdom of the same name, now capital of the modern Abyssinian Province of Tigré, situated in latitude 14° 7′ N., and in longitude 38° 43′ E. Even before the Christian Era, Axum seems to have become the capital of an Ethiopian kingdom, whose chief port was Adule (q.v.), about 100 miles distant, through which it carried on an extensive trade with Egypt and the Roman world. The kingdom of the Axumites seems to have been gradually extended from the borders of Roman Egypt to the south, as far as the Straits of Bab-el-Mandeb, or even Cape Gardafui, and its kings claimed also dominion over the Homerites (or Himyarites) on the Arabian coast of the Red Sea. These kings were acquainted with Greek culture, as is shown by the inscriptions at Adule and Axum. One of those in the latter place was also written in the Geez language, sometimes called Ethiopic, but in the Sabæan characters used in southern Arabia. Christianity was introduced by Ædesius and Frumentius early in the Fourth Century, and in A.D. 356 the Emperor Constantius wrote to King Aizanes, asking his assistance against the teachings of Athanasius. The kingdom later lost its power and wealth with the advance of Mohammedanism, which gradually hemmed it in, though the country has always kept its Christian faith. Axum is regarded now as a sacred city by the Abyssinians, and still contains memorials of its greatness in a large number of curious obelisks and the remains of an imposing Christian church. The population of the town at present is only about 5000. Consult: Dillmann, *Abhandlungen der Berliner Akademie* for 1879 and 1880; Mommsen, *Provinces of the Roman Empire*, Vol. II. (Eng. trans., New York, 1886); Bent, *The Sacred City of the Ethiopians* (London, 1893); Glaser, *Geschichte Arabiens* (Berlin, 1885-90); id. *Die Abessinier in Arabien und Afrika* (Munich, 1895).

AYACUCHO, ä′yä-kōō′chō. A department of Peru, bounded by the Department of Junin on the north, Cuzco and Apurimac on the east, Arequipa on the south, and Ica and Huancavelica on the west (Map: Peru, C 6). Area, 18,185 square miles. The surface is mountainous, well watered; the soil well adapted for agricultural purposes. The agricultural products are very extensive, and form the chief exports of the province. Population, in 1896, 302,469. Capital, Ayacucho (q.v.).

AYACUCHO (Indian, 'corner of death,' referring to a bloody battle once fought on this spot). An episcopal city, capital of the Department of Ayacucho, Peru, situated 240 miles southeast of Lima, on a small tributary of the Mantaro River, 7900 feet above sea-level. The town is the seat of a university, established in 1677. The surrounding district is chiefly devoted to cattle-breeding and agriculture, an active trade in their products being carried on with Lima. Pizarro founded the town in 1539, calling it San Juan de la Victoria de Guamanga. But the city has been called by its present name since 1825, to commemorate a great victory achieved by General Sucre over the Spaniards on December 9, 1824, on the plateau of Ayacucho. This battle assured the independence of Peru. Population, 22,000.

AYALA, å-yä′lå, PEDRO LOPEZ DE. See LOPEZ DE AYALA.

AYAMONTE, ä′yå-mōn′tå. A town of Andalusia, Spain, on the left bank of the Guadiana, near its mouth, where it forms the boundary between Spain and Portugal (Map: Spain, B 4). It is picturesquely situated on the slope and at the foot of a hill. The upper part of the town consists of narrow and irregular streets; those of the lower part are regular and wide. There are three public squares. The principal occupation of the inhabitants is fishing, ship-building, and coast-trading. Population, 1897, 7500.

AYAPANA, ä′yå-pä′nå. See EUPATORIUM.

AYE-AYE, äī′äī′ (native Malagasy name; from its cry). A small, brownish, squirrel-like lemur (*Daubentonia Madagascariensis*), of Madagascar, remarkable for its rodent-like dentition. It is arboreal and nocturnal in habits, living alone or in pairs in the bamboo jungle, constructing ball-like nests of dried leaves, and feeding on juicy vegetables, such as sugar-cane, and upon the grubs of wood-borers, to which its slender and curiously distorted fingers (see plate of AXOLOTL and AYE-AYE) seem especially adapted. Consult *Knowledge* (London, December, 1901) for an illustrated account of its characteristics.

AYESHAH, å-yē′shä, also **AYSHA,** ā′shå, *or* ī′shä, or **AISHA.** The favorite wife of Mohammed, and the daughter of Abu-Bekr, who afterwards became the first Caliph. She married Mohammed at the age of nine. She accompanied him in his campaigns, and upon his death successfully opposed the claims of Ali, and secured the succession for her father. After the death of Othman she was defeated in battle by Ali, and although taken prisoner was treated with great clemency by the victor. She was often called the Prophetess, and was generally denominated the Mother of the Faithful, although she had never borne any issue to Mohammed. Her chastity, which had been impugned, was vindicated by the Prophet in the twenty-ninth sura, or chapter, of the Koran.

AYLESBURY, ālz′bĕr-ĭ. A market-town and the county-seat of Buckinghamshire, England, about 38 miles northeast of London, (Map: England, F 5). Aylesbury contains the only convict prison for women in England. It is chiefly an agricultural town, and has an industry in lace-making and straw-plaiting. Its ducks, raised for the London market, have quite a reputation. Population, in 1901, 9250. Aylesbury is a very ancient town, having been taken from the Britons by the Saxons in 571.

AYLESBURY. A breed of large domestic ducks. See DUCK.

AYLESFORD, ālz′fērd. A village in Kent, England, picturesquely situated on the Medway, 39 miles southeast of London. Remarkable ancient remains occur here, comprising an extensive cromlech, or burying-place, known as Kits-Coity, and, in the neighboring chalk-hills, large circular sepulchral pits.

AYLLON, ī-lyōn′, LUCAS VASQUEZ DE (c.1475-1526). A Spanish adventurer. He came to America, became a member of the Superior Court of Santo Domingo, and in 1521 sent Gordillo to explore the coast of the present Florida. He himself visited James River and Chesapeake Bay in 1524, and, liking the country, applied for and received a grant to the surrounding territory from Charles V. In 1526 he brought about 600 colonists to the site of Jamestown, Va. (q.v.), and with the help of a large number of negro slaves, probably the first ever employed within the present limits of the United States, endeavored to build a town, which he called San Miguel. Before the end of the year, however, he died of fever, and his colony soon afterwards was broken up by sickness, civil strife, and a negro insurrection. Many of the survivors were shipwrecked on their way back to Hispaniola, and only 150 reached their destination in safety. Consult W. Lowery, *Spanish Settlements Within the Present Limits of the United States, 1513-65* (New York, 1901).

AYLMER, āl′mēr. The name of two Canadian lakes. (1) Lake Aylmer, 80 miles north of Great Slave Lake, is about 50 miles long by 30 miles broad. (2) Lake Aylmer, in Wolfe County, Que., lies 69 miles south of Quebec. It is drained by the Saint Francis River.

AYLMER. A village in Wright County, Province of Quebec, Canada, on Lake Deschaines, at the foot of steam navigation for the Upper Ottawa. Population, in 1901, 2291. It is a favorite summer resort, connected with Ottawa by an electric railway.

AYLMER, or ELMER, JOHN (1521-94). An English theologian. He was born at Aylmer Hall, Norfolk; graduated B.A. at Cambridge, 1541, and immediately thereafter became tutor to Lady Jane Grey. In June, 1553, he was made Archdeacon of Stow, but on Mary's accession, October, 1553, he fled the country lest his pronounced Protestantism should bring him into trouble, and lived on the Continent till Elizabeth's accession (1558). In 1562 he became Archdeacon of Lincoln, and in 1577 Bishop of London, in which position he showed a very arbitrary temper and was most unpopular. He died in London, June 3, 1594. His only literary production of note is his reply to John Knox's *Monstrous Regiment of Women*, entitled, *An harborowe for faithfull and trewe subjects, against the late blowne blast concerning the government of women* (Strassburg, 1559). For his biography, consult J. Strype, new edition (Oxford, 1820).

AYLMER, MATTHEW, Lord (c.1643-1720). A British naval officer, born in the county of Meath, Ireland. He entered the navy in 1678, and served until 1688 on the Algerian coast and in the Mediterranean. At the battle of Beachy Head (1690), and at Barfleur (1692), he commanded the *Royal Katherine*. He was made rear-admiral in 1693, vice-admiral in 1694, and admiral in 1698. In the latter year he was sent to the Mediterranean to arrange the treaties with Tunis, Tripoli, and Algiers. He was commander-in-chief of the fleet from 1709 to 1711, and was reinstated upon the accession of George I. (1714).

AYLOFFE, ā′lŏf, Sir JOSEPH (1708-81). An eminent English antiquary. He attended St. John's College, Oxford, for a time and at an early age evinced considerable interest in antiquities. In 1731 he was elected a fellow of the Royal Society, and in the following year a fellow of the Society of Antiquaries. In 1763 he was made one of the commissioners for the preservation of the State papers, and in 1772 published a valuable work entitled, *Calendars of the Ancient Charters and of the Welch and Scottish Rolls Now Remaining in the Tower* (1780). He also wrote several useful papers for the publications of the Society of Antiquaries, and at the time of his death was engaged on the work known as Gough's *Sepulchral Monuments* (1799), which he had projected.

AYMARA, ī′mā-rä′. The name commonly applied to a confederacy or group of semi-civilized tribes centring in the high plateau about Lake Titicaca, in Peru and Bolivia, and numbering now, including mixed bloods, more than half a million. At the time of the discovery they were subject to the Incas, but there is considerable ground for the opinion held by some writers that they are themselves the originators of the Inca (Quichua) civilization. Physically they are distinguished for their great chest development, due to the rarefied air which they breathe. The mysterious cyclopean ruins of Tiahuanaco are within their territory, and are probably of Aymara origin. The language appears to constitute a distinct linguistic stock, although it shows strong Quichuan correspondences.

AYMON, ā′mon. The surname of four brothers, called respectively Alard, Richard, Guiscard, and Renaud, sons of Aymon, or Haimon, Count of Dordogne, who figure among the most illustrious heroes of the chivalric poetry of the Middle Ages. The story belongs to the cycle of romances in which Charlemagne is the central figure. Huon de Villeneuve, a French poet of the time of Philip Augustus (1180-1223), tells the story in his poem, entitled, *Les quatre fils Aymon*, while Ariosto later conferred poetical immortality on the family by the publication of his *Orlando furioso*, in which Renaud, or Roland, the bravest of the four brothers, plays the most distinguished part. Caxton printed, about 1489, an English translation of the story, and in 1884-85 the Early English Text Society reprinted Caxton's work, under the title, *The Four Sons of Aymon*. Tieck, the popular German writer, edited and published the story, but seems to have taken it from a different source. See ROLAND, THE SONG OF.

AYR, âr. A seaport and the county-town of Ayrshire, Scotland, situated on the Firth of

Clyde, at the mouth of the River Ayr, 40 miles south-southwest of Glasgow by rail (Map: Scotland, D 4). Ayr is connected by three bridges with the suburbs of Newton-on-Ayr and Wallacetown, which have constituted a part of the city since 1873, and is a clean and handsome town. A harbor is formed by the estuary of the river, and is protected by piers and a breakwater. In 1874 and succeeding years many improvements were added, including the construction of a large wet-dock. The coasting trade is considerable. The chief export is coal from the Ayrshire collieries. A considerable quantity of grain, timber, iron ore, and manure is imported. At one time much wine was imported from France. The town has an excellent water-supply, obtained from Loch Finlas. It owns and operates an electric-light plant, and maintains markets, slaughter-houses, and a cemetery. The racecourse, owned by the town, is the scene of the 'Western Meeting,' held each year in September. Part of the tower of the old Church of Saint John, built in the Twelfth Century, and turned into a fort by Cromwell, is still standing. The neighborhood of Ayr is rich in associations with the poet Robert Burns. About two miles to the south is the cottage in which he was born, and a little farther on Auld Alloway Kirk (q.v.), and the Auld Brig of Doon of Tam o' Shanter fame. Near the river is the Burns Monument, in the style of a classic temple, containing relics of the poet and two excellent figures of Tam and Souter Johnny, by Thom, a native sculptor. Population, municipal burgh, 1900, 28,624.

AYRER, ī′rēr, Jakob (c.1560-1605). A German dramatist. He was born at Nuremberg, and, next to Hans Sachs, was the most prolific dramatic poet of the Sixteenth Century in Germany. He wrote, largely under the inspiration of English traveling comedians and in the interest of the Protestant Reformation, more than 100 plays between 1595 and 1605. The *Opus Theatricum* (Nuremberg, 1618) contains 30 of his tragedies and comedies and 36 of his Shrovetide plays and vaudevilles. They were sensational in their effects, coarse in language, pedantic sometimes in form, but they helped to turn the popular religious drama of the Sixteenth Century to the service of the new spiritual and national life. Consult: Keller, in *Bibliothek des litterarischen Vereins*, Vol. LXXVI., and "Select Dramas of Jacob Ayrer," in *Deutsche Dichter des XVI. Jahrhunderts*, Vol. CLXXXVI., with a valuable introduction by Tittmann (Leipzig, 1868).

AYRES, ârz, Alfred. See Osmun, Thomas Embley.

AYRES, Romeyn Beck (1825-88). An American soldier. He was born in Montgomery County, N. Y., and graduated at West Point in 1847. He became a captain in 1861, took part in the first battle of Bull Run, and was chief of artillery in Gen. W. F. Smith's division from October, 1861, to November, 1862, and of the Sixth Army Corps from November, 1862, to April, 1863. He served with the Army of the Potomac in the Peninsular Campaign, and afterwards in the battles of South Mountain, Antietam, Fredericksburg, and Chancellorsville (where he commanded a brigade), and Gettysburg (where he commanded a division of the Fifth Army Corps). In August, 1863, his division was ordered to New York to aid in suppressing the draft riots. General Ayres afterwards took a prominent part in Grant's Richmond campaign, was wounded at the siege of Petersburg, and from August, 1865, to April, 1866, when he was mustered out of the volunteer service, was in command of the Shenandoah Valley. At the close of the war he was brevetted brigadier-general and major-general in both the volunteer and the regular service, and afterwards, until his death, served on garrison duty as lieutenant-colonel and colonel in the Regular Army, at various military stations.

AYR′SHIRE. A maritime county in the southwestern division of Scotland, bounded north by Renfrewshire, west by the Firth of Clyde and the North Channel, south by Wigton and Kirkcudbright, east and northeast by Dumfries and Lanark. Area, 1128 square miles (Map: Scotland, D 4). The county is undulating and hilly, the land attaining no great elevation, except a small portion in the north and some considerable tracts in the south and southeast, which are mountainous. It is rich in valuable minerals, especially coal, ironstone, limestone, and freestone. Agriculture is in an advanced state, and dairy-husbandry is carried to high perfection, the breed of milch cows, of which it rears a greater number than any other Scotch county, being noted as the finest in the kingdom for the quantity and quality of their milk. (For illustration, see Plate of Dairy Cattle under Cattle.) The breed of horses is also excellent. Manufactures, especially woolen and cotton, are carried on to a considerable extent at Catrine and Kilmarnock. Great iron-works exist at Muirkirk, Hurlford, Kilwinning, Ardeer, Dalry, and Dalmellington. There are valuable fisheries on some parts of the coast. Troon, Ardrossan, Ayr, and Irvine are thriving ports. The capital is Ayr. Population, in 1801, 84,200; in 1851, 189,860; in 1891, 226,386; in 1901, 254,400. Consult Paterson, *History of Ayrshire* (Edinburgh, 1863-66).

AYRTON, âr′ton, William Edward (1847—). An English physicist and electrical engineer, born in London. He was appointed to the telegraph service of the Indian Government, and in 1873-79 was professor of natural philosophy and telegraphy in the Imperial College of Engineering at Tokio, Japan. In 1879 he was appointed professor of physics in the City and Guilds of London Institute, South Kensington. With Professor Perry he has written a number of treatises on electrotechnics. He has also published *Practical Electricity* (1888).

AYSCUE, ās′kû, Sir George (1616-71). An English admiral. He was knighted by Charles I., but held no command until 1646. Two years later, the neutrality which the navy had preserved while the Civil War raged on land terminated, and a large part of the fleet set sail for Holland. It was chiefly the influence of Ayscue, who sided with Parliament, that prevented the remainder of the fleet from leaving the English coast, and his services were rewarded by an appointment as admiral. In this capacity he reduced Barbadoes (after a stubborn resistance by the Royalist Governor, Willoughby), Antigua, Nevis, Saint Christopher, and the settlements on the Virginia coast (1651). During the following years he was engaged in repeated naval conflicts with the Dutch. In 1666 his flagship, the *Royal Prince*, ran aground and was captured. He himself was seized and carried to Holland, where he was paraded through the towns and exhibited to the populace. He returned to England in 1667.

AYTON, ā'ton, Sir Robert (1570-1638). A Scottish poet. He was born at the Castle of Kinaldie, Fifeshire, and was educated at Saint Andrews, where he took the degree of M.A. in 1588. From France, where he went for study, he addressed, in 1603, a panegyric in Latin hexameters to James I. This poem was the making of Ayton's fortune, for he was soon appointed one of the gentlemen of the bedchamber and private secretary to the Queen. These honors were continued by Charles I. Ayton was on terms of familiarity with the most eminent men of his time, poets, wits, and philosophers alike, among them Hobbes and Ben Jonson. He was a poet of slight merit. He has, however, the distinction of being one of the first Scotchmen to write in the English of the court. To him have been attributed the originals of two songs by Burns, one of which is "Should Auld Acquaintance Be Forgot?" But Ayton probably did not write them. He died in Whitehall Palace in 1638. Consult Rogers, *Poems*, with memoir (Edinburgh, 1871).

AYTOUN, ā'to͞on, William Edmonstoune (1813-65). A Scotch poet. He was born in Edinburgh, June 21, 1813. He received his education at the university there, and was called to the Scottish bar in 1840. In 1845 he was appointed professor of rhetoric and belles-lettres in the University of Edinburgh, and after the formation of the Derby ministry in 1852, he was promoted to the shrievalty of Orkney. He married a daughter of John Wilson. During many years Aytoun devoted himself to literary work. His first important work was *The Life and Times of Richard I.* (1840)—a subject well treated and singularly in consonance with his romantic nature. He was also a master of caricature and parody and many of the *Bon Gaultier Ballads* were from his pen. In 1848 he published the popular *Lays of the Scottish Cavaliers and Other Poems*, which established his reputation as a poet of the school of Scott. Among his subsequent writings are: *Firmilian: A Spasmodic Tragedy* (1854); and *Bothwell* (1856), a narrative poem of considerable length, in the measure and manner of Scott. His edition of the *Scottish Ballads*, 2 vols., appeared in 1858. In the following year he issued, in conjunction with Theodore Martin, translations of various minor poems of Goethe. He was for many years one of the most frequent and brilliant contributors to *Blackwood's Magazine*. Aytoun was distinguished at once as poet and humorist. His poems exhibit a ballad-like simplicity and a fiery flow of narration, while his tales—the best known and appreciated of which are *The Glenmutchkin Railway* and *How I Became a Yeoman*—possess a certain robust humor and farcical abandonment which made them widely popular. Aytoun died August 4, 1865. His life was written by Theodore Martin (London, 1867).

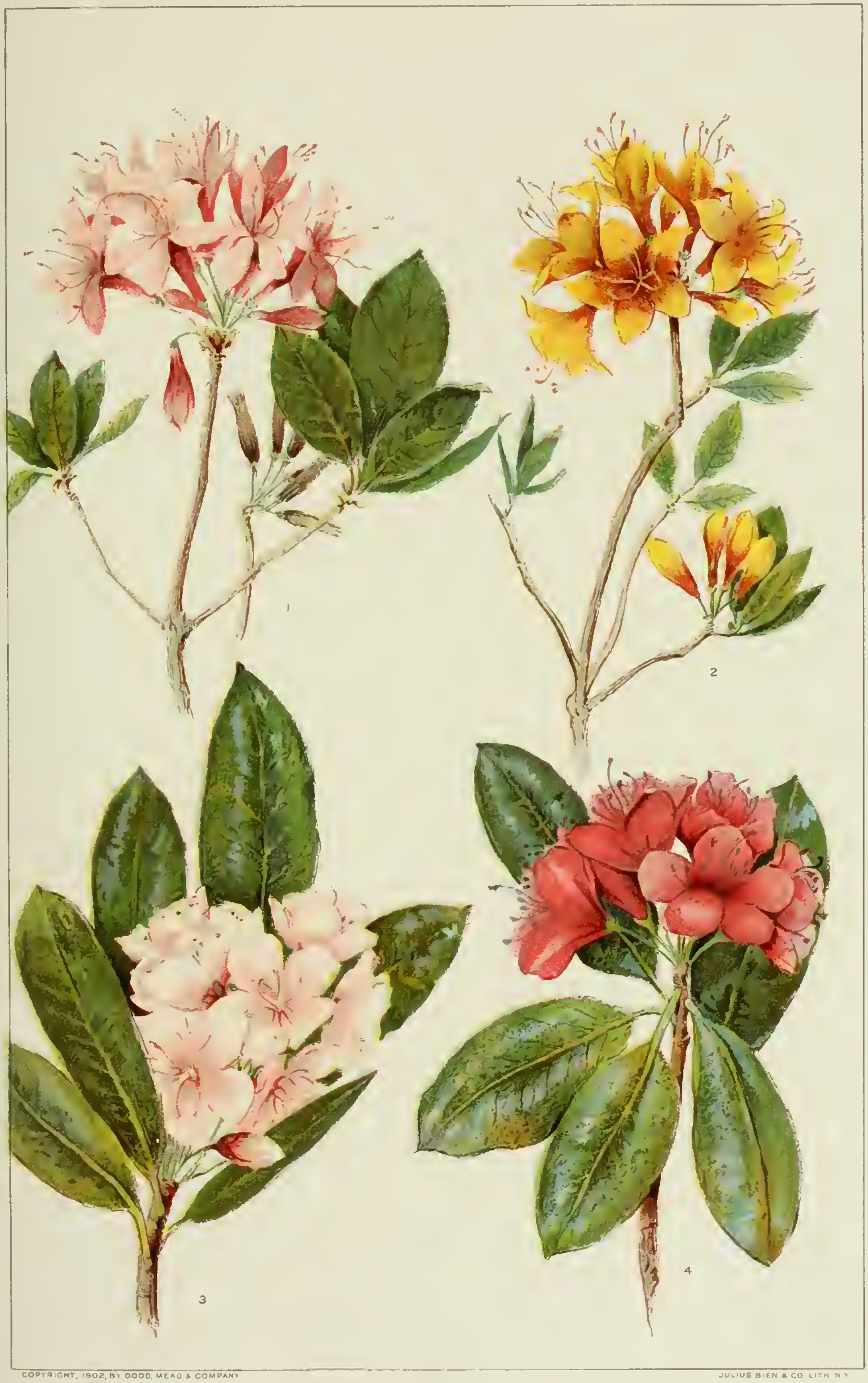
AYUB IBN SHADI, ȧ-yo͞ob' 'b'n shä'dē (?-1173). The father of Saladin. He was a Kurd, and a member of the tribe of Rawadiya. With his two sons he went to Bagdad, and thence to Tikrit, which he made his home, and where his body lies in an elaborate tomb, surmounted by a cupola. He won high military rank in Syria and Mesopotamia, and lived to see his famous son subjugate the Fatimites and establish the Ayubite Dynasty in Egypt and Syria. The Crusades and the wars of the Mongols were important events in the history of this dynasty. In 1250 the Ayubites were supplanted in Egypt by the Mamelukes, who murdered Turan Shah, the last prince of the line.

AYUB KHAN, kän. The youngest son of Shere Ali. His father made him Governor of Herat, and he retained that position under his brother, Yakub. After Yakub's abdication he actively opposed the English, and on July 27, 1880, he overwhelmed General Burrows's command at Kushk-i-Nakhud, after which he laid siege to Kandahar. General Roberts hastened from Kabul, performing a memorable march, to relieve Kandahar, and on September 1 dispersed the forces of Ayub Khan, who fell back on Herat. In 1881 Ayub Khan captured Kandahar, but he was unable to maintain himself against the new Ameer, Abd-ur-Rahman. After the loss of Herat he went to Persia, where he was under the espionage of the Persian Government, acting for the English. During the insurrection of the Ghilzais, in 1888, he formed a conspiracy to capture Herat, but was detected and delivered to the English, who imprisoned him at Rawal-Pindi, in the Punjab.

AYUNTAMIENTO, ȧ-yo͞on'tȧ-myȧn'tō (Sp. from *yuntar*, Lat. *iungere*, to join; cf. *junta*). The name given to the municipal councils in Spain. Wide powers of self-government were enjoyed by the cities under Roman rule, and these rights were greatly augmented during the long struggle of the Christian kings against the Mohammedans. In 1521 the cities felt themselves powerful enough to rise against Charles I., under the celebrated Juan de Padilla (q.v.). The insurrection was suppressed, the liberties of the towns were greatly curtailed, and under the Bourbons the last vestiges of municipal freedom disappeared. The Liberal Cortes of 1812 reëstablished many of the ancient powers of the towns, but these were abolished on the restoration of Ferdinand VII. During the troubled times that followed previous to 1875, the ayuntamientos, as political factors, were exalted or suppressed, according as the Liberal or Reactionary elements were in power. At present the communes possess a wide scope of authority in the administration of municipal affairs, but enjoy nothing of the political influence which formerly the towns exercised. At the head of the commune is the ayuntamiento, elected by the people, and appointing from among its own members the alcalde and his subordinates, the *tenientes*. As a rule, the councils are not free from the interference of the Central Government in matters touching on general politics.

AYUTHIA, ȧ-yo͞o'thē-ȧ. A city in Siam on the Menam River, 45 miles north of Bangkok, founded in 1351, and long the national capital. It was assaulted and nearly destroyed by the Burmese in 1767, but until well into the Nineteenth Century was the second city in the kingdom. It still possesses importance as the centre of trade with South Laos, most of its business being direct with Bangkok. The present town, called Krung-Kras, is built largely on the water. The old city is, for the most part, in

AZALEAS & RHODODENDRONS



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1 WILD HONEYSUCKLE - PINXTER FLOWER - AZALEA NUDIFLORA
2 FLAME AZALEA - AZALEA CALENDULACEA
3 GREAT LAUREL - ROSE BAY - RHODODENDRON MAXIMUM
4 MOUNTAIN ROSE BAY - RHODODENDRON CATAWBIENSE

ruins, and overgrown with an abundance of tropical vegetation, amid which piles of masonry, sculptured masses, bronze statues, and spires may be discerned. In the days of its glory it was 9 miles in circumference, and within its walls were different quarters, in which dwelt foreigners, who came for trade from many countries—Chinese, Malays, Portuguese, Japanese, and various Asiatics. The most conspicuous structure, 400 feet high, built in the form of a pyramid and surmounted by a domed spire, is called the 'Golden Mount.' At one time, when trade was lively between Japan and Siam, it is believed that no fewer than 700, possibly 7000, Japanese dwelt at Ayuthia, 500 of them serving as mercenary soldiers to resist the Burmese. These Japanese formed part of the bodyguard, and took part in the palace revolution of 1633. The city was also the scene of the missionary labors of the Portuguese, and of a bloody battle between the Dutch and the English—one of the incidents which led to the naval wars of the Seventeenth Century. Population, about 50,000.

AYVAZOVSKI, ī'vȧ-zôf'skē, Ivan Konstantinovitch (1817-1900). A Russian painter, born at Feodosia, in the Crimea. He studied at the Academy of Fine Arts, Saint Petersburg, and under Philippe Tanneur, traveled widely in Europe, and exhibited from 1847. His marine pictures are generally esteemed his best work. At the Columbian Exposition in Chicago (1893), Ayvazovski exhibited a series of paintings dealing with the discovery of America by Columbus, which were greatly admired. His canvases for the most part display brilliant effects, but have been criticised for their extremely ornate treatment and their exaggeration of color. A list of his more important pictures includes: "Sunrise on the Black Sea" (1850); "The Deluge" (1865); "Calm Sea;" "Naples by Moonlight;" and several views of storms at sea.

AZA'LEA (Gk. ἀζαλέος, *azaleos*, dry, so called because supposed to grow best in dry ground). A genus of plants belonging to the natural order Ericaceæ (heath family). Some botanists unite the genus Azalea to Rhododendron. One of the species best deserving of notice is *Azalea pontica*, a shrub from 3 to 5 feet high, a native of the countries around the Black Sea, with large obovate or oblong, lanceolate shining leaves and umbellate yellow flowers, which are externally covered with glutinous hairy glands, and are very fragrant. It covers many mountain slopes, but does not ascend to great elevations, giving place to the more alpine *Rhododendron ponticum*. It is common in gardens and shrubberies in Britain, and varies with orange, red, and almost white flowers. The whole plant is narcotic and poisonous. North America abounds in azaleas as well as in rhododendrons, and some of the species have been long cultivated in Great Britain, particularly *Azalea nudiflora* and *Azalea viscosa*, which, with *Azalea pontica*, have become the parents of many hybrids. The former has pink, the latter pure white flowers, of delightful fragrance. *Azalea viscosa* has the flowers covered with glutinous hairs like *Azalea pontica*; but the flowers of *Azalea nudiflora* are nearly destitute of them. Both species abound from Canada to the southern parts of the United States (the latter is sometimes known by the common name of honeysuckle). *Azalea arborescens*, a mountainous species, from 3 to 10 feet high, has large rose-colored flowers. *Azalea calendulacea*, a native of the southern parts of the United States, is described as frequently clothing the mountains with a robe of living scarlet. India and China produce several species of azalea, of which one of the finest is *Azalea indica*, well known as a greenhouse shrub. Its flowers exhibit great brilliancy of colors. Many hybrids exist between it and the more hardy species. Another extremely beautiful species is *Azalea liliflora*, an evergreen introduced from China.

AZANCHEVSKY, ä'zän-chyĕf'skē, Michael von (1838-81). A Russian composer. He was born in Moscow, studied under Richter and Hauptmann at Leipzig, and was director of the Conservatory at Saint Petersburg from 1870 to 1876. He was the owner of a noteworthy musical library, and was an acknowledged authority in general music. Among his many compositions are a *Sonata in B Minor* for pianoforte and violoncello; a *Trio in F Sharp Minor* for pianoforte and strings; and a *Fest Polonaise*, for two pianofortes.

AZARA, ȧ-thä'rȧ, Felix de (1746-1811). A Spanish soldier, naturalist, and traveler. He was born at Barbunales, in Aragon, was educated at the University of Huesca, obtained a commission in the Spanish Army, and rose to the rank of brigadier-general. He was severely wounded in the attack upon Algiers. In 1781 he was appointed one of the commissioners for fixing the boundaries of the Spanish and Portuguese possessions in South America. He did not return to Spain till 1801, when he published an account of his travels in his *Voyage dans l'Amérique méridionale* (1809), and an important work on quadrupeds and birds, under the modest title of *Notes on the Natural History of Paraguay and La Plata* (1802).

AZARA, José Nicolo de (1731-1804). A Spanish diplomat, born at Barbunales, Aragon, a brother of Felix de Azara. He studied at the universities of Huesca and Salamanca, and in 1765 was appointed Spanish Envoy at the Papal Court. Here he exercised a very considerable influence, and was concerned with the suppression of the Jesuit Order in 1773, and with the election of Pius VI. Subsequently he was sent on missions to Paris and Barcelona. He was known as a patron of art, edited the works of his friend Mengs, with a biography (1780), and translated (1792) Middleton's *Life of Cicero*.

AZARA'S DOG (or **FOX**). See Fox-Dog.

AZ'ARI'AH (Heb., the Lord helps). The name of a number of biblical personages, no less than twenty-four being found. (1) The most important of these is Azariah, the son of Oded, a prophet who, by his exhortation of Asa, King of Judah, brought about a religious reform (II. Chron. xv. 1-8). Of the same name were at least four high-priests at various times. (2) In the reign of Solomon (I. Kings, iv. 2); (3) in the reign of Asa (I. Chron. vi. 10); (4) in the reign of Uzziah (II. Chron. xxvi. 16-20); (5) in the reign of Hezekiah (II. Chron. xxxi. 10), who helped the King in the purification of the Temple. (6) Another Azariah, of the tribe of Ephraim, was one of four who sided with the prophet Oded, when he preached against the Israelites for attempting to make captives of

Judah (II. Chron. xxviii. 12). (7) Called also Abednego, one of the three men thrown into the fiery furnace (Dan. i. 11).

AZAROLE, ăz'ȧ-rōl. See CRATÆGUS.

AZAZEL, ăz'ȧ-zĕl'. A name occurring in connection with the services on the Day of Atonement (Lev. xvi. 8, 10, 26). Two goats were taken by the high-priest, one of which was slaughtered. and the other, after the sins of all Israel had been confessed over its head, was led out by some one to the Wilderness and thrown over the rocks. The symbolism conveyed by the act is evident. All the sins of the people were handed over to Azazel. This name appears later in the Apocryphal writings as the chief of the angels who married human beings and begat of them wicked men (Gen. vi.). Azazel was bound by angels and laid in the Desert, at a place Dudael, identified by Schick with Bet-hudedun, a chalky cliff near Jerusalem, to await his punishment. It appears that the rite of Azazel is a remnant of an ancient demon-worship, which was changed and modified for the purposes of the Levitical writers.

AZEGLIO, ȧd-zā'lyō, MASSIMO TAPARELLI, Marchese d' (1798-1866). An Italian statesman, author, and artist, the descendant of an ancient and noble Piedmontese family. He was born at Turin, October 4, 1798. After a brief service in a Piedmontese cavalry regiment, which ill-health forced him to abandon, D'Azeglio went to Rome and devoted himself to art, winning an enviable reputation in landscape painting. After his father's death, in 1830, he went to Milan, and there made the acquaintance of Manzoni, whose daughter he married. Through Manzoni he was introduced into the literary circle of the day, and soon afterwards made his début in literature with the patriotic novel *Ettore Fieramosca* (1833), and *Niccolò de' Lapi* (1841), which did much toward fanning the national spirit in Italy. The political affairs of Italy soon occupied him exclusively, and called forth his famous attack upon the Papal Government, *Degli ultimi casi di Romagna*, in which he strenuously urged upon the Italian princes the necessity of a national policy. After the election of Pope Pius IX., D'Azeglio went to Rome, and to him are to some extent ascribed the reforms with which Pius began his government. He took part in the campaign of 1848 against Austria, both in Lombardy and in Venetia, and was severely wounded at the battle of Vicenza. On the opening of the Sardinian Parliament he was chosen a member of the Chamber of Deputies, and, after the unfortunate battle of Novara, March 23, 1849, was intrusted by Victor Emmanuel II. with the task of forming a ministry; and his careful and shrewd policy, especially toward France, won him at the time as many enemies as later it gained him admirers. He was succeeded, in 1852, by Cavour. At the close of the war, in 1859, D'Azeglio was appointed *pro tempore* general and commissioner extraordinary (purely military) for the Roman States. He died January 15, 1866. Since his death, *L'Italie de 1847 à 1865; correspondance politique de Massimo d'Azeglio* (1866), and other writings from his pen, including an autobiographical work, *I miei ricordi*, have appeared (Florence, 1873). There have been published numerous biographies of D'Azeglio, including those by Camerini (Turin, 1861); Giuliani (Florence, 1866); Massari (Turin, 1867); Morozzo (Florence, 1884). Consult also Vismara, *Bibliografia di Massimo d'Azeglio* (Milan, 1878).

AZERBAIJAN, ä'zēr-bī-jän' (anciently, *Atropatene*). (See ATROPATENE.) The most northerly province of Persia, bounded on the south by Persian Kurdistan and Irak, east by Ghilan and the Caspian Sea, north by Russian Armenia, and west by Turkish Armenia and Turkish Kurdistan. It has an area of about 40,000 square miles. The surface of Azerbaijan is very mountainous, many of the ranges rising from 7000 to 9000 feet in height. The peak of Savalan (an extinct volcano) reaches an elevation of 13,000 feet. Mount Ararat rises on the northwest border. The chief rivers of Azerbaijan are the Aras or Araxes, Kara-Su, and the Kizil-Uzen. The salt lake Urumiah (q.v.), the largest in Persia, is situated in the western part of the province. The climate of Azerbaijan is not unhealthful, but is very unsteady. In the mountainous regions, the winters are very severe, and in the lowlands the summers are exceedingly hot. The principal products of Azerbaijan are rice, barley, wheat, maize, flax, hemp, cotton, tobacco, honey, and saffron. Cattle-raising is carried on extensively by the Kurds. The province is very rich in minerals, and especially in marbles. Silver, copper, iron, coal, and oil are also found. The population of the province is estimated at 1,000,000. The bulk of the natives are physically of the type of the Persians of the Teheran-Ispahan country, but speak a dialect of Turkish, offering a good field for the study of race language phenomena. Ripley (1899) considers the 'Azerbaidjan Tartars' to have been Iranized by contact with the dolichocephalic Aryans about them, while preserving their primitive speech. It is possible, however, that not a few Azerbaijanis are simply the descendants of Persians who have intermingled with the natives and adopted their language. The capital is Tabriz. See CAUCASIAN; TATARS.

AZEVEDO, ä'zâ-vā'dō, MANOEL ANTONIO ALVARES DE (1831-52). A Brazilian poet, born at São Paulo. He studied law at the university there, and afterwards published a volume of poems, entitled *Lyra dos vinte annos* (5th ed., 1884), which consists chiefly of elegies and displays a high degree of talent. His *Obras* were first published in 1853; the *Obras completas* appeared in 1862 (3 vols., with a biographical notice by J. Monteiro). Consult F. Wolf, *Le Brésil littéraire* (Berlin, 1863).

AZEVEDO Y ZUNIGA, ä'thâ-vā'dô ē thōō'nyė-gä, GASPARD DE, Count of Monterey (1540-1606). Viceroy of Mexico and Peru (1595-1603). He sent out several expeditions in California and New Mexico for exploration and settlement. Monterey, founded in 1596, and the Bay of Monterey, were named in his honor.

AZ'IMUTH (Fr. *azimut*, from Ar. *as-sumut*, a way, or point in the horizon). In astronomy, the azimuth of a heavenly body is the angle measured along the horizon between the north or south point, and the point where a circle passing through the zenith and the body cuts the horizon. The word comes from the Arabic, and is said to be derived from a word signifying a quarter of the heavens. Astronomers usually measure astronomical azimuth westward from the beginning at 0°, and returning to it at 360°. Thus, in northern latitudes, where the North

Pole is elevated, the azimuth is measured from the south point, so that the east point, for instance, has an azimuth of 270°. Navigators and surveyors generally reckon azimuth from the nearest principal point of the compass. Thus, W. 24° S. would mean an azimuth 24° from west in the direction of south; and astronomically this would be simply 66°. See AMPLITUDE.

AZINCOURT, à′zăN′kōōr′. See AGINCOURT.

AZ′OBEN′ZENE, $C_6H_5.N{=}N.C_6H_5$. A valuable compound of carbon, hydrogen, and nitrogen. It is a red, crystalline substance, insoluble in water, but soluble in alcohol or in ether. When pure, it melts at 68° C. and boils, without being decomposed, at 293° C. It may be prepared by treating nitro-benzene (q.v.) with a solution of stannous chloride in soda, the precipitate thus produced being washed with water and recrystallized from petroleum-ether. By the reducing action of tin and concentrated hydrochloric acid, azobenzene is converted into the substance called benzidine ($NH_2.C_6H_4.C_6H_4.NH_2$), which is extensively used in making the so-called azo dyes. See COAL-TAR COLORS.

AZ′O COL′ORS. See COAL-TAR COLORS.

AZO′IC (Gk. ἄζωος, *azōos*, lifeless, from ἀ, *a* priv. + ζωή, *zōē*, life). A name applied by Sir Roderick Murchison, in 1845, to the old crystalline rocks of the Scandinavian Peninsula, in recognition of the fact that they contain no traces of organic life. Later the name was adopted by both European and American geologists to designate similar rocks that lie at the bottom of the geological column beneath all the fossiliferous rocks of the earth's crust. Eventually, a conflict arose between the advocates of the name azoic and those who preferred the term 'primitive,' the conflict being over the theories of origin involved in these names, rather than in the use of the names themselves. With a view to terminating this discussion, J. D. Dana proposed, in 1872, the name 'archæan,' thus avoiding all theory of origin, with the result that the terms 'azoic' and 'primitive' shortly ceased to be applied by the leading geologists to rock formations. Azoic is, however, still employed in another sense (Dana's *Manual of Geology* [4th ed.], New York, 1896, p. 440), being applied to the second 'æon' or great period of time, without organic life, through which the earth passed before the advent of those conditions that permitted the growth of living matter. Rocks of this æon have not as yet been definitely recognized in the earth's crust. For the description of the rocks originally considered as azoic, the reader is referred to the article on PRE-CAMBRIAN FORMATIONS; and also to ALGONKIAN SYSTEM; and ARCHÆAN SYSTEM.

AZORES, à-zōrz′ (Portug. *Açores*, so called from *açores*, hawks, found there). A group of islands in the Atlantic Ocean, situated about 800 miles west of Portugal, to which they belong (Map: Africa, B 1). They extend over 400 miles, from about latitude 37° to 40° N., and from longitude 25° to 31° 16′ W., and occupy an area of 1005 square miles. Excluding the uninhabited reefs, the group numbers nine islands, divided into three sub-groups; the eastern, consisting of the islands of São Miguel, or Saint Michael's (299 square miles), and Santa Maria (38 square miles); the central group, embracing the islands of Pico (173 square miles), Terceira (164 square miles), São Jorge (91 square miles), Fayal (69 square miles), and Graciosa (24 square miles); and the western group, consisting of Flores (54 square miles) and Corvo (7 square miles). The entire archipelago is of volcanic origin and very mountainous, the highest volcanic summit being Pico Alto (7540 feet) on the Island of Pico. The volcanic origin of the islands is shown by the large number of hot springs scattered all over the group, and by the earthquakes from which the islands have suffered even in comparatively recent times. Streams are abundant. The climate is mild, and snow is seen very seldom. The highest temperature is about 86°, but the humidity is sometimes excessive. The Azores are becoming gradually a winter resort. The native flora is very poor, numbering only 40 out of the 440 species found on the islands. The same is even more true of the fauna, the indigenous species being confined only to a variety of cow of a very low breed and a bullfinch. The soil is very fertile, and the mild climate allows of the cultivation of southern fruits, such as olives, oranges, grapes, and bananas. In general the flora of the Azores resembles that of Spain.

Agriculture is greatly impeded by the unequal distribution of land, and the emigration of the landless population to British Guiana, West Indies, and South America is steadily increasing. The Azores carry on a considerable trade in fruit with Portugal, England, Brazil, and North America. Oranges, formerly the chief article of export, are now gradually being replaced by pineapples and corn. The imports come chiefly from Great Britain. The Azores have only a few safe harbors, the chief among which is that of Angra, the capital of the archipelago, on the Island of Terceira. Administratively, the archipelago is considered a province of Portugal, and is divided into the three districts of Angra do Heroismo, Horta, and Ponta Delgada. Population, in 1890, 255,594, consisting chiefly of Portuguese, with a slight admixture of negroes, mulattoes, and some settlers from Great Britain.

The discovery of Phœnician coins on the Island of Corvo would indicate that the Azores were visited by Carthaginian traders. They appear on the maps of the mediæval Arabian geographers, and on an Italian map of 1351. They were discovered for Portugal by Gonçalo Velho Cabral and others, between 1431 and 1460. They were then uninhabited. Two of the islands were named Corvo and São Jorge, from Corvos Marinos and Saint Jorsi, which, according to the maps of the Fourteenth Century, had been previously seen in the western ocean. In 1466, Alfonso V. made a life-grant of the Island of Fayal to his aunt, the Duchess of Burgundy, and from this circumstance many settlers migrated thither from Flanders.

Consult: Ray, *The Azores* (Washington, 1892); P. T. L., "Azorean Economics," in *The Nation*, Vol. LXXIII. (New York, 1901).

AZ′OTH (Ar. *al*, the + *zāūq*, Pers. *zhīwah*, quicksilver). The panacea of Paracelsus, regarded by his followers as 'the tincture of life.' See PARACELSUS.

AZ′OTIN (Fr. *azote*, nitrogen, from Gk. ἀ, *a*, priv. + ζῆν, *zēn*, to live). A nitrogenous fertilizer prepared from meat-refuse, practically identical with AMMONITE (q.v.).

AZO′TUS. Same as Ashdod (q.v.).

AZOV, ȧ-zôf′. A fortified town and seaport in the Russian territory of the Don Cossacks, on the left bank of the river Don, about 25 miles east of Rostov, and within 5 or 6 miles of the Sea of Azov (Map: Russia, E 5). The principal industries are fishing and gardening. It carries on an extensive trade in grain, serving as an outlet for the southeastern part of Russia. Population, in 1885, 16,600; in 1897, 27,500. The flourishing trading colony of the Greeks, Tanaïs, on or very near the present site of Azov, was conquered by Mithridates (B.C. 115). Then it fell under the successive rule of the Sarmatians, Huns, Khazars, and the Petchenegs. In the Tenth Century, it was captured by the Russian prince Vladimir I. When in the Thirteenth Century it was taken by the Genoese, Azov became the commercial centre and entrepôt for the Indo-Chinese trade, and the Genoese fortified it by high walls and towers. In 1395 Tamerlane took the town and sacked it. In 1471 the Turks conquered it, and called it and the neighboring sea Asak. The closing of the Black Sea by the Turks to all navigation, followed by the discovery of the sea-route to India, brought about the speedy decline of the town. In 1696 Peter the Great took the town. Captured later more than once by the Turks, it was finally ceded to Russia in 1774, by the Treaty of Kutchuk-Kainardji. In 1855 it was bombarded and greatly injured by an allied English and French squadron.

AZOV, Sea of. A large gulf connecting with the Black Sea by the Strait of Kertch and inclosed by Russian territory (Map: Russia, E 5). Its greatest length is about 200 miles, its width about 120 miles, and its area is estimated at about 15,000 square miles. At its northeast extremity it becomes narrow, and forms the Gulf of Taganrog. It has some islands, of which Berusch Island is the largest (about 65 square miles). Its shores are mostly low and sandy, with only here and there, especially on the south, a short strip of rocks. Its waters contain very little salt—so little, indeed, that in the neighborhood of Taganrog it is used for drinking. It is very shallow, and but poorly fitted for navigation. The three ports on its shores are Taganrog, Mariupol, and Berdiansk, annually visited by about 2700 vessels, with a tonnage of about 500,000. The sea abounds in fish. A narrow strip of the sea, on the west, cut off from the main body by a long tongue of land, and bordering on the Crimea, is called Sivash (q.v.), or *Putrid Sea*. The Sea of Azov receives several large rivers, the most important of which is the Don, near whose mouth is the town of Azov.

AZPÉITIA, ȧs-pā′ê-syȧ, *Castilian Sp. pron.* ȧth-pā′ê-tyȧ. A district town in the Spanish Province of Guipúzcoa, situated on the Urola, a short distance from San Sebastian. It contains interesting remains of ancient buildings, has mineral springs, and in its vicinity is situated the Loyola Monastery, occupying the site of the house in which the founder of the Society of Jesus was born in 1491. Population, about 7000.

AZRAEL, ăz′rȧ-ĕl (Heb., help of God). In Mohammedan belief, Azrael, also called Izrail, is the angel of death (Koran, surah xxxii. 11), and is often called Malak-al-Maut. It is he who separates the soul from the body, doing this gently or harshly, as the case may be. When a man has been God-fearing, the soul leaves as gently as water from a bag; but the soul of an infidel is drawn out as a hot spit out of wet wool. The angel of death figures also in Jewish literature.

AZ′TEC (from Nahuatl *aztlan*, place of the heron, or the 'Heron' clan). A name frequently used to designate all the ancient semi-civilized tribes of Nahuatlan stock in Central and Southern Mexico, but properly applying only to a small group of seven cognate tribes occupying the valley of Mexico and its immediate vicinity. According to tradition they had migrated together from the north. The principal tribe fixed its capital at Tenochtitlan, now the City of Mexico, and by successive wars of conquest gradually acquired dominion over nearly all the tribes of Southern Mexico, thus building up the Mexican Empire, which flourished for perhaps two centuries until overthrown by Cortes in 1521. Although possessed of a high degree of culture, perhaps derived from their predecessors in the country, the Aztecs were distinguished for their cruelty and the bloody character of their religious rites. Some of their descendants, still retaining their ancient language, reside in outlying villages in the neighborhood of the City of Mexico. See Cortes; Mexico; Montezuma; Nahuatlan Stock.

AZTEC CLUB OF 1847. A society formed to cherish the memories and traditions of the Mexican War. The club was founded in the City of Mexico, in 1847. Membership proceeds by primogeniture. The members number about 300.

AZUA, ȧ-sōō′ȧ, or **AZUA DE COMPOSTELLA**, dā kŏm′pō-stĕl′yȧ. A town in the Province of Santo Domingo, in the island of Haiti, on the Bia River, 4 miles from Ocoa Bay, and 60 miles west of the city of Santo Domingo (Map: West Indies, M 5). It has sulphur springs, and the horses of the neighborhood are greatly prized. Population, 2000.

AZUAY, ä′sōō-ī′. A province of Ecuador, situated in the southwestern part of the country, and covering an area of about 11,150 square miles. The surface is mountainous. Agriculture and cattle-raising are the chief occupations of the inhabitants, who are mostly Indians. The cinchona tree is found in abundance on the mountain slopes. Population, in 1890, 132,400. Capital, Cuenca (q.v.).

AZULEJO, ä′thōō-lā′Hō (Sp. *azul*, blue; see Azure). The name given, on account of its prevailing color, to a kind of painted glazed tile made originally by Mohammedan artists in Persia, Egypt, Spain, etc., and used for the decoration of wall surfaces. (See Tiles.) Some patterns were repeated century after century, and the Spaniards, who inherited the art of making them from the Moors, modified the designs and colors so slightly that it is not easy to distinguish a Renaissance from an early mediæval Spanish tile.

AZUNI, äd-zōō′nê, Domenico Alberto (1749-1827). A distinguished Italian jurist and historian, born at Sassari, in the Island of Sardinia. In his youth he began the study of law, devoting himself particularly to the maritime relationships of nations, on which he became a great authority. He was judge of the tribunal of commerce at Nice when that city was occupied by the French in 1792, and then retired to Florence, where in 1795 he published his *Sistema universale dei principi del diritto marittimo dell' Europa*, which appeared afterwards in French as *Droit maritime de l'Europe*. He was summoned to Paris to act as one of the commissioners for compiling the new commercial code, and in 1807 was appointed president of the court of appeal at Genoa. After the downfall of Napoleon he was made judge of the tribunal at Cagliari. Among his works the following, in addition to the above, are the most noteworthy: *Dizionario universale ragionato della giurisprudenza mercantile* (1786-88); *Histoire géographique, politique et naturelle de la Sardaigne* (1802).

AZ'URE (OF. *azur*, Med. Lat. *lazurius*, also *azura* with the loss of *l* due to confusion with the article; from Pers. *lazhward*, azure, *lājaward*, lapis lazuli). The name for blue in heraldry (q.v.).

AZ'URINE (from the azure color). A variety of one of the European chubs or roach, the rudd, distinguished from the type by the slate-blue color of the back, the silvery white of the abdomen, the whiteness of the fins, and the fact that the iris of the eye is tinged with pale straw color, instead of the red of the rudd or 'red-eye.' Hence it is frequently called 'blue roach,' and is known in science as *Leuciscus erythropthalmus*, variety *cæruleus*. It is an inhabitant of the Swiss lakes and of the streams of the Continent of Europe generally; and is said to have been introduced into Great Britain by Yarrell. It does not exceed a pound in weight, but is hardy, furnishes good sport for the angler, and breeds readily; nevertheless it has not spread far from Knowsley, the seat of the Earl of Derby, in whose park it was first acclimated. Its flesh is firm and of good flavor. See Roach.

AZ'URITE (from its azure color). A blue basic cupric carbonate, containing about 55 per cent. of copper, and crystallizing in the monoclinic system. It differs in composition from malachite only by containing more carbonic acid and less water. With the blow-pipe, azurite gives a metallic bead, while it is soluble in acids and ammonia, and in such solutions can readily be tested for copper. It is usually found with malachite and other ores of copper, and the specimens from Chessy, near Lyons, France, are noted for their fine crystallization, and are called *chessylite*. The azurite from Siberia is frequently cut in Russia into thin slabs, and used as veneering for table-tops, and the like. Crystals of azurite, found in Arizona, are highly regarded as gems, although they are too small to be extensively used. The amorphous variety of azurite is a valuable ore of copper; it occurs in great quantities in some of the Arizona mines, where it is actively wrought. In the Clifton district it is found in limestone and is accompanied by other ores of copper, including malachite, cuprite, melaconite, and native copper, and by limonite. The Copper Queen Mine in the Bisbee district has produced solid masses of azurite and malachite weighing several tons. The mineral in all cases is probably to be regarded as of secondary origin; i.e. it has been derived from other copper minerals by the natural processes of oxidation and hydration. The original sources of material are copper sulphides, which are still found in the deeper portions of the mines where the weathering agencies have not penetrated. Azurite has also been used as a pigment.

AZ'YGOS (Gk. *ἄζυγος*, *azygos*, unwedded, not paired, from *ἀ*, *a* priv. + *ζυγόν*, *zygon*, yoke). A term used in medicine to denote a part or a structure which has no fellow of the opposite side of the body, as the sphenoid bone, certain single veins, the thyroid gland, etc. The word is chiefly used of the muscle of the uvula, which was named the *azygos uvulæ* under the mistaken idea that it was a single muscle with two origins, namely at the posterior nasal spines of the palate bone, and running thence to the tip of the uvula. It has been discovered that there are two muscles in a pair. Their duty is to raise the uvula. This pair is sometimes called the *azygos Morgagni*.

AZ'YMITES (*ἀ*, *a* priv. + *ζύμη*, *zymē*, leaven). The opprobrious name given by the Eastern to the Western Church, arising from a difference about the use, in the Lord's Supper, of leavened or unleavened bread. Michael Cærularius, Patriarch of Constantinople (1043-1059), made this one of his counts against the Western Church, and ever since it has been so considered. The Western, or Latin branch, insisted that unleavened bread might be used, and the Greek Church stigmatized the Latins as 'Azymites,' because they did not use leaven. The Latins retorted with 'Pro-zymites,' also 'Fermentarians;' but the terms, intended for reproach, soon passed, with the whole discussion, into history as useless additions to polemical nomenclature.

In the 'Longer Catechism of the Eastern Church,' prepared by Philaret, approved by the Holy Synod in 1839, and the most authoritative doctrinal standard of the Orthodox Græco-Russian Church, question 328 is: "Of what kind should be the bread for the Sacrament?" and the answer is: "Such as the name itself of the bread, the holiness of the Mystery, and the example of Jesus Christ and the Apostles all require: that is, leavened, pure, wheaten bread" (cf. Schaff, *Creeds of Christendom*, ii. 496).

The exact time when the Latin Church first employed unleavened bread in the Eucharist to the exclusion of the leavened, is undetermined, and, perhaps, undeterminable; but surely this use can be traced to the Ninth Century. The canons of earlier councils, e.g. of the Council of Toledo (693) and of Chelsea (787), upon the bread merely prescribe that it should be a specially prepared loaf, but not that it should be leavened or unleavened. Cf. art. "Elements," in Smith and Cheetham, *Dict. Christ. Antiq.*

B

B The second letter in the Græco-Roman alphabet. The Phœnician character had a closed loop, which in the Aramaic alphabets opened out, assuming the shape seen in the square Hebrew and the Arabic letter. There were two complete loops in the Greek form, from which was developed the prevalent cursive form B. The minuscule *b* of our alphabet is from the majuscule Latin of the mediæval manuscripts, and its relation in form to the capital letter is obvious. It is found as early as the First Century of our era, scratched on the walls of buildings in Pompeii. In time the upper loop was lost, and the letter assumed practically its present form. The Hebrew name for the letter is *beth*, 'a house,' because the original pictographic form was the outline of a house or tent. This word appears as *βῆτα*, *bēta*, in the Greek alphabet, and is retained in our word *alpha-bet*. See ALPHABET; LETTERS.

PHONETIC CHARACTER. B is the voiced or soft labial explosive. According to certain fixed laws, it may interchange with *p*, *v*, or *f*. (See PHILOLOGY; PHONETICS; GRIMM'S LAW.) Thus, Lat. *bibo*, I drink, Skt. *pib-āmi*, Old Irish *ebaim*, Cornish *evaf;* and Gk. *ἐπίσκοπος*, *episkopos*, bishop, AS. *biscōp*, Fr. *évêque;* again (orig. *bh*) Skt. *bhar-ami*, I bear, Gk. *φέρω*, *pherō*, Lat. *fero*, Eng. *bear*. In Greek and late Latin (of the Fourth Century), *b* was softened to *v*, as is the case in modern Greek to-day. During the classical period of Latin, the sound was that which we now have. But later it had the sound of *v*, which in many cases passed into French and Italian; for example, Lat. *habere*, It. *avere*, Fr. *avoir;* and Lat. *tabula*, It. *tavola*. In Spanish *b* between two vowels has very much the sound of *v*, and there is also a tendency to sound *b* in place of *v*. Before *s* or *t*, the *b* in Latin was sounded like *p*, as we know from inscriptions where *pleps* is written for *plebs*, and *urps* appears for *urbs*. Thus, we have *scripsi* for *scrib-si*, and *opsequor* for *ob-sequor*. The letter *b* is silent now in some words of Latin derivation, like *debt*, *doubt*, and also when excrescent, as in *limb* (AS. *lim*), *lamb*, *thumb*, and the like.

AS ABBREVIATION. B is used also as a symbol and in abbreviations. The Greek *β* denoted 2, and B 2000. In chemistry, B stands for *boron*, one of the elements. In music, B denotes the seventh or 'leading' tone of the diatonic scale of C. In academic degrees, B. is an abbreviation of *Baccalaureus*, *Bachelor*. See ABBREVIATIONS.

BAADER, bä'dẽr, BENEDICT FRANZ XAVER von (1765-1841). A German Roman Catholic theologian and philosopher. He was born in Munich, March 27, 1765, the third son of the court physician to the Elector of Bavaria. His elder brothers were distinguished, Clemens as an author and Joseph as an engineer. Franz studied medicine at Ingolstadt and Vienna, graduating in 1784; assisted his father in medicine, but disliked the profession; studied engineering in the mining districts, and lived five years in England (1791-96), where he became acquainted with rationalistic philosophy, which he thought little less than satanic. The religious speculations of Eckhart, Saint Martin, and especially Böhme, were more to his mind. He held intimate friendship with Jacobi, and learned something of Schelling. Though deeply interested in philosophy, he kept his engineering practice. On his return from England he was appointed consulting engineer of the Bavarian mines; won the prize of 10,000 gulden for the discovery that Glauber's salt, instead of potash, may be employed in making glass; was ennobled in 1813 for his valuable services, and was superintendent of mines, 1817-1820. His first published work was *Fermenta Cognitionis* (Berlin, 1822-24, five parts; sixth part, Leipzig, 1825), in which he combated modern philosophy and recommended that of Böhme. In 1826 he was appointed professor of philosophy and speculative theology in the new University of Munich. Some of his lectures while occupying that chair have been published (*Vorlesungen über spekulative Dogmatik*, Münster, 1828-38). In 1838 he opposed the interference in civil matters of the Roman Catholic Church, to which he belonged, for which opposition he was interdicted from lecturing on the philosophy of religion during the last three years of his life. The interdict took the form of a general order forbidding laymen to lecture on the subject. So he was restricted to his lectures on psychology and anthropology. His criticism of the Papacy and his desire to see it abolished no doubt contributed to his being silenced. Baader is considered to have been the greatest speculative Roman Catholic theologian of modern times, and his influence has gone beyond the bounds of his Church. He also contrasted Eastern and Western Catholicism, to the detriment of the latter (Stuttgart, 1841); but ere he died he recanted. He died in Munich, May 21, 1841. His works were published in a collected edition (Leipzig, 1851-

60, 16 vols.; Vol. XV. contains his biography, by F. Hoffman).

Consult: J. Claasen, *Franz von Baader's Leben und theosophische Werke als Inbegriff christlicher Philosophie: Vollständiger, wortgetreuer Auszug in geordneten Einzelsätzen* (Stuttgart, 1886-87); Otto Pfleiderer, *The Philosophy of Religion on the Basis of its History*, Vol. II. (Eng. trans., London, 1887); for an elaborate article upon his teachings, see Hoffmann, *Biographie und Briefwechsel* (Leipzig, 1887); Welzer and Welte, *Kirchenlexikon*, Vol. I. (Freiburg, 1877).

BAAL, bä'*a*l. A word common to the Semitic languages, and signifying owner or possessor. It is applied to the ordinary social conditions. The owner of a house or a field is its Baal, and similarly the husband is the Baal to his wife. From such a usage the term came naturally to be applied to the patron deity of a place to whom, in a measure, the place belonged, since he presided over its destinies. This application of Baal is particularly appropriate in the case of people who had reached the agricultural stage, and who would naturally ascribe the ultimate ownership of the fields to the local deity, whose favor was shown by a rich return from the soil. Hence Baal became, among Canaanites and Phœnicians, the general term designating a local deity; and the complement, added to the term, would indicate what particular Baal was meant. Thus we have a Baal of Tyre, of Sidon, of Mount Hermon, of Peor, of Meon, of the Lebanon, etc. Again, a Baal might be distinguished by some special attribute, and this would then be added to the term; as, e.g. Baal-Berith, 'Baal of the Covenant,' Baal-zebub, 'Baal of flies,' and the like; and, lastly, we find Baal as a general term for 'lord,' used as a honorific adjunct to the real name of a deity,—as Baal-Gad, Baal-Zephon,—in which cases Gad and Zephon are names of gods. There were thus as many Baals as there were towns, or sanctuaries, or objects which had a religious significance. Still it is natural that certain Baals should become more prominent than others, and it might even happen that one should become the Baal *par excellence*. Thus in Babylonia, through a chain of development which we need not dwell upon here, the deity of one of the most ancient cities (Nippur) became the Baal or Bel of Babylonia, and was known to later ages simply as Bel; and again, in the West, the Baal of Tyre, whose name was Melkart, assumed at one time such prominence that his worship was introduced among the Hebrews by Ahab, and he is sometimes referred to in the Old Testament simply as Baal.

Another and rather curious development taken on by the Baal idea was the dissociation of the deity from any particular place; and this gives rise to such cults as that of Baal-Hamon and Baal-Shamem, which acquire prominence among the Phœnicians and their offshoots. The former may be the personification of the sun-god, though this is not certain; the latter is the god who dwells in heaven, and bears analogies, therefore, to the Greek Zeus. In tracing the religious development of ancient nations in general, we must make allowance for this tendency to form conceptions of divine powers which seem to reach out into higher spheres. The Baal-worship among the Hebrews, of which we hear so much in the Book of Kings and in the Prophets, represents the adoption on the part of the Hebrews of the Canaanitish cults. In dispossessing the Canaanites, the Hebrews wished to assure themselves of the good-will of the numerous Baals; and since fertility of the soil was in the control of the Baals, as the Canaanites believed, the Hebrews, when they became agriculturists on Canaanitish soil, naturally took over the worship of the Baals at the various ancient sanctuaries of the land. In order to reconcile this departure with fidelity to the national deity, Jehovah himself was called Baal, and His name was thus associated with the cults at the altars and sanctuaries, which generally were erected on prominent spots, the so-called 'high places,' or in groves. With Elijah, a movement to purify Jehovah's worship of its foreign elements begins, which, taken up vigorously by the prophets of the Ninth and Eighth centuries B.C. leads to tentative attempts in Judæa, such as the reforms of King Josiah, to stamp out the Baal rites; but it is not until the new conditions brought about by the destruction of the southern kingdom that the hope of the Jehovists to establish Jerusalem as the only legitimate sanctuary of Jehovah is realized, and after the return of the exiles the worship is reconstructed on the lines laid down by such 'purists' as Isaiah, Jeremiah, and Ezekiel.

BAALBEK, bäl'bĕk. The name of a ruined city in ancient Cœle-Syria, signifying the 'city of Baal,' the sun-god. The name was converted by the Greeks, during the Seleucidan dynasty, into its Greek equivalent, Heliopolis. It is situated in latitude 34° 1′ N., longitude 36° 11′ E., in the plain of Bukâ'a, "at the northern extremity of a low range of bleak hills, about one mile from the base of Antilibanon," in a well-watered and delightful locality, rather more than 40 miles northwest of Damascus. It was once the most magnificent of Syrian cities, full of palaces, fountains, and beautiful monuments. It is now famous only for the splendor of its ruins. The most imposing is that of the great Temple of the Sun, which was a rectangular building 290 feet by 160, having its roof supported by a peristyle of 54 Corinthian columns, "19 at each side and 10 at each end." Of these, 6 are yet standing. The circumference of these columns is about 22 feet, and the length of the shaft 58; with pedestal, capital, and entablature, they measure about 80 feet in height. The temple occupies a platform on the Acropolis, about 1000 feet by 450 feet, approached on the east by a broad flight of steps, which lead to a portico. Beyond this is a hexagonal court, through which a large gateway opens into the great square, at the west end of which is the temple, on a lofty stylobate. Except the columns mentioned, little of the great temple, or of the buildings in front of it, is left standing, but the ground is covered with their ruins. The vast size of the stones used in the substructures of the great platform is remarkable, some of them being over 60 feet long and 12 thick. South from the great temple is a smaller one, known as the Temple of Jupiter. It is similar in form, having its peristyle and the walls of its cella still mostly standing. Its dimensions are 227 feet in length by 117 feet in breadth, with 15 columns at the sides and 8 at each end. Both temples, as well as the surrounding structures, were built of limestone, in a richly decorated, somewhat fantastic Corinthian style. Besides these, there stands at the distance of 300 yards from the others a circular building, supported on 6 granite columns; style, mixed Ionic and Corinthian. It was once used as a Christian church.

The early history of Baalbek is involved in darkness but it is certain that from the most distant times it had been a chief seat of sun-worship, as its name implies. Augustus made it a Roman colony and placed there a garrison. Baalbek had an oracle held in such high esteem that in the Second Century A.D. it was consulted by the Emperor Trajan prior to his entrance on his second Parthian campaign. Antoninus Pius (A.D. 138-161) built the great temple which the legend current among the modern inhabitants counts a work of Solomon. The platform and substructures are, however, of a much earlier date. This temple is said to have contained a golden statue of Apollo, or of Zeus, which on certain annual festivals the chief citizens of Heliopolis bore about on their shoulders. When Christianity, under Constantine, became the dominant religion, the temple became a Christian church. In the wars that followed the taking of the city by the Arabs, who sacked it in A.D. 748, the temple was turned into a fortress, the battlements of which are yet visible. The city was completely pillaged by Timur in A.D. 1400. Both city and temple continued to fall more and more into decay under the misery and misrule to which Syria has been subject ever since. Many of the magnificent pillars were overturned by the pashas of Damascus, merely for the sake of the iron with which the stones were bound together. What the Arabs, Tartars, and Turks had spared was destroyed by a terrible earthquake in 1759. Baalbek is now an insignificant village, with a population of some 2000, of whom more than half are Christians. The Prussian Government conducted, in 1902, quite extensive excavations on the Acropolis.

Consult: Wood and Dawkins, *Ruins of Baalbec* (London, 1757); Cassas, *Voyage pittoresque de la Syrie* (Paris, 1799); Murray, *Handbook for Travelers in Syria and Palestine* (London, 1892); Frauberger, *Die Akropolis von Baalbek* (Frankfort, 1892); W. M. Thompson, *The Land and the Book*, Vol. III. (New York, 1886); Baedeker, *Syria and Palestine* (Leipzig, 1894); Puchstein, in *Jahrbuch des deutschen Archäologischen Instituts* (Berlin, 1902).

BAARLE, bär′le, or **BAERLE**, VAN. See BARLÆUS, KASPAR.

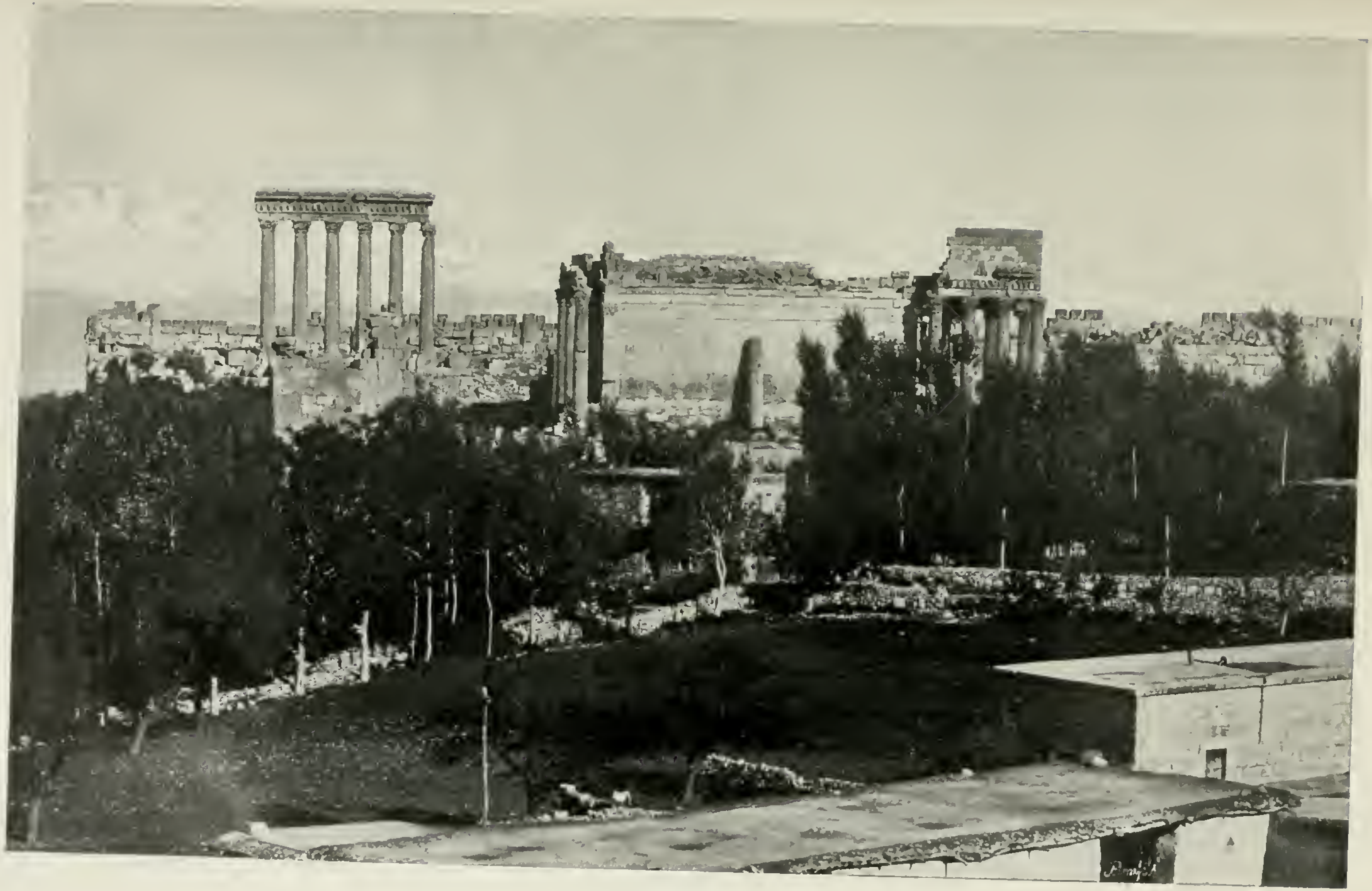
BAB, LADY. The name assumed by Kitty, the maid, in James Townley's *High Life Below Stairs* (q.v.). She has an exaggerated idea of her own breeding, and never reads any books except 'Shikspur.' Her pseudonym is taken from the name of her mistress.

BAB, THE. See BABISM.

BABA, bä′bȧ. A Turkish word (*bābā*), which signifies 'father.' In Persia and Turkey it is prefixed as a title of honor to the names of ecclesiastics of distinction, especially of such as devote themselves to an ascetic life; it is often affixed in courtesy, also, to the names of other persons, as Ali-Baba.

BABADAGH, bä′bȧ-däg′ (Turk. *bābā*, father, chief + *dagh*, mountain). A town in the district of Tultcha (Dobrudja), Rumania, situated in a marshy district, 31 miles southwest of Ismail (Map: Turkey in Europe, G 2). It has five mosques, of which the finest is the one built by Bajazet I., who founded the city. He peopled it with Tartars, and named it after a saint, whose monument on a hill near by is a much-frequented pilgrim resort. Through the port of Kara-Kerman, lying a short way to the south, a considerable commerce is carried on with the Black Sea region. Population, in 1890, 3301.

BAB′BAGE, CHARLES (1792-1871). An English mathematician and inventor, born near Teignmouth, Devonshire. He early devoted himself to mathematics, particularly its analytical branches, and pursued his systematic education at Trinity College, Cambridge, from which he received his baccalaureate degree in 1814. Two years after graduating he published, jointly with Herschel and Peacock, a translation of Lacroix's *Calculus*, and four years later they published an excellent collection of mathematical problems. Meanwhile, the idea of constructing a machine for calculating mechanically various tables of mathematics and astronomy had been ripening in Babbage's mind, and in 1820 he undertook the practical execution of this difficult task. The model of his machine was found eminently satisfactory by the Royal Society in 1823, and the Government consented to aid him in carrying out the idea on a large scale. In order to familiarize himself with all the resources of mechanical art, he visited manufactories and machine establishments in Great Britain, and in 1827-28 traveled on the Continent. These investigations resulted in a number of highly valuable improvements in machinery and manufacturing processes, and although the completion of his main task was not yet in view, important service was rendered by the publication of his brilliant work, *On the Economy of Manufactures and Machinery*, the first edition in 1832, and several subsequent editions and translations into foreign languages. The Government, however, fearing that the construction of his calculating-machine was an impossibility, had refused to give him further aid; and thus Babbage was thrown upon his own resources, continuing his work until 1856, but never completing it. Yet the realization of his machine is even now considered as quite possible, and its inestimable value in case it were realized is appreciated by some of the best mathematicians of our time. While mainly devoted to his invention, Babbage also made a number of important contributions to pure mathematics. He invented a new and important branch of higher analysis, wrote on the applications of mathematics to questions of insurance and gambling, and did much to raise the standard of mathematical teaching in England. In recognition of his services to science, he was made a member of many learned societies, and from 1828 to 1839 was nominally Licasian professor of mathematics at Cambridge. He was one of the founders of the Astronomical Society, and to his writings was due, in great measure, the founding of the British Association. The list of his works includes as many as eighty titles, but most of his writings were left un-



BAALBEK

GENERAL VIEW OF THE ACROPOLIS

completed. Among his works that deserve notice are his excellent *Table of Logarithms* (1827), and the autobiographical *Passages from the Life of a Philosopher* (1864), besides those already mentioned above.

BAB BAL'LADS, THE. A collection of doggerel verses by W. S. Gilbert, half nonsense, half satire, on various subjects, ranging from the shipwreck of corpulent admirals to the loves of the London 'bobby.' It was published in London in 1868, but the ballads had previously appeared separately in *Fun*.

BAB'BITT, ISAAC (1799-1862). An American inventor, born at Taunton, Mass. He became a goldsmith, and manufactured at Taunton (1824) the first Britannia-ware made in the United States. In 1839 he invented the alloy known as 'Babbitt metal' (q.v.), for which he received a gold medal, and in 1841 a grant of $20,000 from Congress. This metal, and also soap, he afterwards manufactured extensively.

BABBITT MET'AL. A soft, white, antifriction alloy, invented by Isaac Babbitt, of Boston, Mass., in 1839. It is prepared by melting separately 4 parts of copper, 12 parts of tin, and 8 parts of antimony, to which, when it is completely melted, there is added 12 more parts of tin. The antimony is poured into the tin, and then mixed with the copper away from the fire, in a separate pot. The proportions vary somewhat, according to the purposes for which the alloy is intended. For his invention Babbitt received a gold medal from the Massachusetts Charitable Mechanics' Association in 1851, and later the sum of $20,000 from Congress. It was patented in England, and also in Russia.

BAB'COCK, JAMES FRANCIS (1844-97). An American chemist and scientific lecturer. He was born in Boston in 1844. After studying chemistry at the Lawrence Scientific School, he established in Boston an analytical laboratory. He was professor of chemistry at the Massachusetts College of Pharmacy and at the Boston University, and for many years filled the positions of State assayer and inspector of liquors and city inspector of milk. He is known as the inventor of a fire-extinguisher and as a scientific lecturer, and has published a number of official reports on sanitary topics.

BABCOCK, MALTBIE DAVENPORT (1858-1901). An American Presbyterian clergyman. He was born at Syracuse, N. Y., August 3, 1858; graduated at Syracuse University, in 1879, and at Auburn (N. Y.) Theological Seminary, in 1882; became pastor of the First Presbyterian Church, Lockport, N. Y., in 1882; of the Brown Memorial Church, Baltimore, Md., in 1887; and of the Brick Presbyterian Church, New York City, 1899. On the very threshold of what promised to be an exceptional career, he died at Naples, Italy, May 18, 1901, as he was on his way home from a trip in the East. After his death his wife and Miss Sanford published some selections from his spoken and written words, including some admirable poems, under the title, *Thoughts for Every-day Living* (New York, 1901); and later appeared *Letters from Egypt and Palestine* (1902).

BABCOCK, ORVILLE E. (1835-84). An American soldier, born at Franklin, Vt. He graduated at West Point in 1861, and served in the Federal army throughout the Civil War. He was aide-de-camp to General Banks in July and August, 1861; served in the Peninsular campaign; was chief engineer for the Central District of Kentucky from April to June, 1863, and of the Department of Ohio from January to March, 1864; and, as lieutenant-colonel, was aide-de-camp to General Grant in the Richmond campaign. At the close of the war he was brevetted brigadier-general in the Regular Army, for 'gallant and meritorious services in the field.' He afterwards continued to serve as Grant's aide-de-camp until 1869, and from 1869 to 1877, during the latter's term as President, was his private secretary. After 1871 he also served as superintending engineer of public buildings. In 1870, as President Grant's unofficial representative, he negotiated with Santo Domingo a treaty of annexation, which, however, was rejected by the Senate. In 1876 he was accused of being implicated in the 'Whisky Ring' frauds, but was acquitted on trial. He was drowned at Mosquito Inlet, Fla., on June 2, 1884.

BABCOCK, STEPHEN MOULTON (1843—). An American agricultural chemist, born at Babcock Hill, Oneida County, N. Y. He graduated at Tufts College, in 1866, and studied chemistry at Cornell University from 1872 to 1875, and at Göttingen University in 1877. He made an especial study of the chemistry of milk and its products, and invented the Babcock milk-tester —a highly valuable appliance, now much used, not only by farmers (for ascertaining the amount of fat in milk), but in tests prescribed by municipalities. In 1893 Professor Babcock occupied the chair of agricultural chemistry in the University of Wisconsin, and from 1888 to 1900 he served as chemist to the New York State Experiment Station. With Dr. G. C. Caldwell, he is author of *A Manual of Qualitative Chemical Anaylsis*.

BA'BEL, TOWER OF. The name given to the structure reared in the Valley of Shinar, at which, according to biblical tradition, the confusion of the tongues takes place (Gen. xi.). The story of the building of the tower is told in the eleventh chapter of Genesis. According to this chapter, mankind, constituting a single united body and possessing the same speech, came in the course of their wanderings to a valley in the land of Shinar, where they devised a plan of using clay as building material and bitumen as cement. They are represented as the first city-builders; but in addition are fired with the ambition to erect a tower which shall reach to heaven, and which, being visible everywhere, will prevent them from being dispersed over the face of the globe. This plan arouses the jealousy of Jehovah, who, in anthropomorphic fashion, is portrayed as 'coming down' to see the city and the tower. Jehovah fears the power of united mankind and brings about a confusion of tongues, so that those working together shall no longer understand one another. As a consequence, men desist from building the city, and they are scattered in all directions. The name of the place where the confusion takes place is called Babel, which is explained as though from a stem (*balal*) meaning 'to confuse,' whereas in reality Babel signifies 'gate of El' (i.e. God). This narrative, according to the modern Oriental view, belongs to the Yahwistic stratum in Genesis, and is by the same writer (or school of writers) as the story of Paradise. It is probably based on an old myth, such as is found among various peoples, intended to account for the curious phenomenon of the multiplicity of speech, which is looked upon by pious Hebrew writers as a curse (in Deut. xxviii. 49; Jer. v. 15); but the story has been reshaped and made the medium of casting discredit upon Babylonian culture, which was distasteful to Hebrew writers, whose ideals were bound up with agricultural life, and who, like the pious Mohammedans of to-day, looked upon great structures as evidence of power, and the various ambitious designs of a progressive civilization as flying in the face of Providence.

Since the narrative implies not only the dispersion, which it is intended to explain, but the existence of Babylon as a great centre, we are brought down to the period of the New Babylonian Monarchy, when Babylon assumed the position of mistress of the world (Dan. iii). But more than this, the story also assumes a check to ambitious designs. The tower is not completed; and this statement implies that Babylon's glory has reached its limit, so that we may pass still farther down to the period of the conquest of Babylon by Cyrus as the time when the story received its present shape. The tower is a reference to the high constructions which are a characteristic feature of religious architecture in Babylon. The city of Babylon had, as one of the edifices sacred to Marduk, a tower of seven stages, built of brick, and known as *E-temen-anki*, 'house of the foundation-stone of heaven and earth,' which was restored and finished by Nebuchadnezzar. It is here that there was also a seven-staged tower, sacred to Nebo in Borsippa, opposite Babylon, the ruins of which the later Jewish tradition identified with the Tower of Babel, but it is credible that the writer of the Genesis story had in mind the 'Tower of Zikkurat,' as the Babylonians called the towers which were in the city of Babylon itself. With the advent of Cyrus, Babylon lost much of its significance; and it could well be said, in a description of this period of decline, that people ceased building the city (Gen. xi. 8). For the significance of the Tower of Zikkurat, in Babylonia, the reader may be referred to Jastrow, *Religion of Babylonia and Assyria*, chapter xxvi. (Boston, 1898).

BAB-EL-MANDEB, bäb'el-män'dĕb (Ar., 'gate of tears,' or of 'sorrow'). The strait separating Arabia, at its southwest extremity, from the continent of Africa, and connecting the Red Sea with the Arabian Sea and the Indian Ocean (Map: Asia, D 7). It is bordered on the east by the Cape of Bab-el-mandeb, which rises to a height of 865 feet, and on the west by the precipitous coast of Africa, which reaches, in Ras-Sejan, an altitude of 400 feet. The strait is divided by the island of Perim (q.v.) into two channels — the western, 13 miles wide and 185 fathoms deep; the eastern, only about 2 miles in width and from 8 to 12 fathoms deep, but preferred on account of its safe anchorage. The volcanic islets called the 'Eight Brothers,' lie close to the African coast. The strait derives its name from the perils it offers to small sailing vessels.

BABELSBERG (bä'bels-bĕrk) **PAL'ACE.** A picturesque English Gothic château near Potsdam, built in 1835-49, in the midst of a beautiful park. The interior is simple but homelike, and contains the study and many personal relics of Emperor William I., with whom Babelsberg was a favorite resort during the summer months.

BABENBERG, bä'ben-bĕrk, COUNTS OF. A line of Frankish counts whose ancestral seat was at Castle Babenberg, near the present Bamberg, in Northern Bavaria. Poppo of Babenberg was Margrave of Thuringia till 892. His three nephews, Adelbert, Adalhard, and Henry, are celebrated for the desperate feud they carried on against the family of the Conradins, whose territorial acquisitions in Thuringia threatened the ascendency of the Babenbergs. The three brothers perished in the struggle. Luitpold of Babenberg—whose descent, however, from the Bavarian Babenbergs is not conclusively established—received from the Emperor Otho II. in 976 the sovereignty over the East Mark, later known as Austria. His descendants ruled in Austria till 1246. See AUSTRIA-HUNGARY.

BABER, bä'bĕr, **BABAR**, or **BABUR**, ZAHIR UD-DIN MUHAMMAD (c.1482-1530). The first of the Great Moguls in India, a descendant of Timur and of Genghis Khan. He was barely 12 years of age when he succeeded his father, Omar Sheikh Mirza, in Ferghana, and he soon conquered the entire country between the Jaxartes and the Oxus. Later he was driven from Bokhara by the Uzbegs of Turkestan, and founded a new kingdom in Afghanistan. After making unsuccessful efforts to recover his realm in Turkestan, Baber turned his ambitious designs toward India. The weakness of Ibrahim Lodi, Emperor of Delhi, enabled him to carry out his schemes of conquest. After some preliminary incursions, he crossed the Indus at the close of 1525, and in April, 1526, on the plain of Panipat, not far from Delhi, he fought a decisive battle with his enemy, whose army was far superior in numbers. The 100,000 men and 1000 elephants of Ibrahim Lodi were dispersed; Ibrahim himself fled; and Baber made his entry into Delhi. In the following month, Agra, the second city of the Empire of Delhi, surrendered. In 1527 Baber secured himself in the possession of his new realm by a great victory over the Rajputs. Thus was founded the famous empire of the Great Mogul, which under Baber's successors rose to extraordinary splendor. Baber's enjoyment of empire in India was short; he died in 1530, having had to contend, during the four years of his reign, with numerous conspiracies and revolts. To the talents of a general and a statesman, which he manifested in his conquests, his improvements of public roads, measuring of lands, adjustment of taxation, postal arrangements, etc., Baber united a taste for science and art. He wrote, in the Tatar language, the history of his own life and conquests, which was translated into Persian by Abd-ul Rachim, and more recently from the Persian into English by Leyden and Erskine in 1826. Baber was succeeded on the throne of Delhi by the eldest of his four sons, Humayun. Consult: Caldecott, *Life of Baber, Emperor of Hindustan* (London, 1844); Stanley Lane-Poole, *Babar* (London, 1899).

BABES IN THE WOOD. A nursery tale, and a ballad of unknown origin, preserved in Percy's *Reliques* and in other collections. Two children are left to perish in the forest by an uncle, who expects to profit by their death.

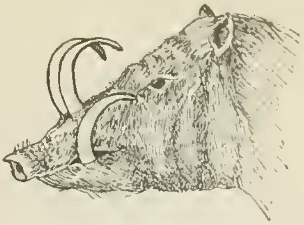
BABEUF, bȧ'bẽf', François-Noël (1760-97). A French political agitator and revolutionist, born at Saint-Quentin, November 23, 1760. He was at first a land-surveyor. He became an enthusiastic adherent of the Revolution, and established a paper (*Journal de la Liberté de la Presse*) which, in July, 1794, began its second series of numbers under the title, *La Tribune du Peuple*. Absolute equality; the realization of the ideal of average mediocrity; communism of land and property; the sovereignty of the masses —these were the ideals for which he stood, and which he advocated in violent language. He spoke of himself as Gracchus Babeuf. His participation as ringleader in a plot to overthrow the Directory and to reëstablish the Constitution of 1793, resulted in his death sentence, in 1797. Consult Advielle, *Histoire de Babeuf et du Babourisme* (Paris, 1884). See Communism; and Socialism.

BABI, bä'bė. See Babism.

BABINET, bȧ'bē'nā', Jacques (1794-1872). A French physicist, born at Lusignan, Vienne. He was appointed professor of physics at the Collège Saint-Louis, at Paris, and in 1840 was made a member of the Academy of Sciences. To him are due various improvements in the air-pump, the hygrometer, and other apparatus. In general, however, he was known less as an investigator than as a clever expositor. His publications include: *Traité de géométrie descriptive* (1850); *Études et lectures sur les sciences d'observation et leurs applications* (1855-68); and *Télégraphie électrique* (1861).

BAB'INGTON, Antony (1561-86). An English Roman Catholic gentleman and conspirator. He was born at Dethick, Derbyshire, October, 1561. At ten years of age, he was left an orphan with a rich heritage, and became a page to Mary, Queen of Scots, during her imprisonment at Sheffield. In 1586 he was persuaded by Ballard and other Catholic emissaries to head a plot to murder Queen Elizabeth, to effect the release of Mary, and to organize a general uprising of the Catholics. The conspiracy became known to Walsingham, Elizabeth's secretary, who at the right moment arrested Babington and his accomplices. They were condemned and executed by hanging and quartering in London, September 20, 1586. Four months later, Mary, Queen of Scots, was beheaded, mainly on the evidence of a letter approving of the murder of Elizabeth, which she had written to Babington. She denied the authorship, and her friends maintained that the document was written by Walsingham himself, as a trick to implicate and entrap the conspirators; but the truth of this accusation is, at least, doubtful. On the day of his death, Babington explained the cipher in which the letter was written; and there is other evidence, alleged to be satisfactory, of Mary's complicity in the plot. Consult: *Maria Stuarts Briefwechsel mit A. Babington* (Munich, 1886); Collier, "Fourteen Notable Traitors," in Vol. 1., *Illustrations of Early Popular Literature* (London, 1863).

BABIRUSSA, băb'ĭ-rōō'sȧ (Malay *bābi*, hog + *rūsa*, deer). An East Indian wild hog (*Babirussa alfurnus*), inhabiting Celebes and Buro, called also 'horned hog' and 'pig-deer.' It is nearly naked, slender-legged, and active, and feeds upon fallen fruits instead of rooting in the ground. The boar is remarkable for his long, exposed canine teeth. "The tusks of the lower jaw are very long and sharp; but the upper ones, instead of growing downward in the usual way, are completely reversed, growing upward persistently out of long sockets through the skin on each side of the snout, curving backward to near the eyes, and in old animals often reaching 8 or 10 inches in length." It is difficult to understand the use of these teeth, which are not possessed by the sows. A. R. Wallace offers, as explanation, that probably they were once useful, and were then kept worn down by constant use, but that changed conditions of life have rendered them unnecessary, and they now develop into monstrous form, as will the persistently growing teeth of beavers and rabbits when distorted so that the opposite teeth do not wear them away.



TUSKS OF BABIRUSSA BOAR.

BABISM, bäb'iz'm. A term applied to the beliefs of a sect in Persia, founded by Mirza Ali Muhammad ibn Radhīk, born about 1824, who assumed the name of Bab-ud-Din, i.e. 'gate of the faith.' On returning from a pilgrimage to Mecca, in 1843, the Bab appeared in his native city of Shiraz with a new commentary on the Koran, and soon became engaged in controversy with the regular priests, or *mullahs*, who, exasperated by his free criticism of their conduct, obtained an order forbidding him to teach in public, and confining him to his house. He taught privately, however, but increased his pretensions, until he declared he was the Nuqtah, 'the point,'—an epithet of Mohammed as well. He thus claimed to be not merely the recipient of a new divine revelation, but the focus in which all preceding dispensations converged. He gained proselytes rapidly. Among these was a woman,—a remarkable circumstance in any country of the East,—known as Gurrad-ul-Ain ('consolation of the eyes'), because of her surpassing loveliness, which was enhanced by her intelligence and purity. The sect made rapid progress with their new religion, but they were not molested until the accession of Nasr-ed-Din in 1848. At this juncture the Babis, in fear of persecution by the new Shah, arose in rebellion and proclaimed the Bab as a universal sovereign, when a civil war ensued. Hussein, one of the disciples, was made prisoner, after defeating several expeditions sent against him, and was put to death in 1849; and the next year Balinrushi, another leader, was slain in battle. The Bab himself, who had taken no active part in the rebellion, was imprisoned and executed at Tabriz, in 1850, after a long incarceration; but his death did not discourage his followers. They recognized Mirza Yahya, a youth of noble descent, and son of the Governor of Teheran, as his successor, who established himself in Bagdad. An attempt, in 1852, of some zealous

Babis to assassinate the Shah, led to a terrible persecution, in which the beautiful 'consolation of the eyes' perished.

The Babi doctrines are essentially a system of pantheism, with additions from gnostic and other sources, and they may be regarded as a development of the mystic or Sufiistic movement against the orthodox Mohammedanism of the Sunnis, which has lasted with great persistence since the first introduction of Islam into Persia. All individual existence is regarded as emanating from the Supreme Deity, by whom it will ultimately be reabsorbed. Great importance is attached to the number 7, as indicating the attributes supposed to be displayed in the act of creation; and to the number 19, which mystically expresses the name of the Deity himself, and is, moreover, the sum of the prophets among whom the latest incarnation of the divine nature is conceived to be distributed in the present dispensation, and of whom the Bab himself is the chief. The sacred college cannot become extinct until the final judgment, the death of any of its members being immediately followed by a reincarnation. Moses, Christ, and Mohammed are considered to be prophets, but merely precursors of the Bab and inferior to him. The morals of the sect are good; polygamy and concubinage are forbidden; the veiling of woman's face is omitted, and the equality of sex is so far recognized that at least one of the nineteen prophets must always be a female. Among the Babis women have a position of honor. They join in social intercourse, and are freed from many of the degradations to which orthodox Mohammedanism subjects them, such as the extreme facility of divorce on the part of the husband. Asceticism is discountenanced, mendicancy forbidden, and hospitality, charity, generous living, and abstinence from intoxicating liquors and drugs and tobacco, as well as prohibition of slave-dealing, are taught and practiced. The Babis live in outward conformity to the religion of Mohammed. The faith of the Bab has found a few adherents in America, like other Oriental religions which have sent their apostles to this country.

Consult: Browne, *A Traveler's Narrative Written to Illustrate the Episode of the Bab* (Cambridge, 1892); Huart, *La religion de Bab* (Paris, 1889); and Andreas, *Die Babis in Persien* (Leipzig, 1896).

BABOO, bä'bōō, or **BABU** (Hind. *bābū*; Canarese *bābū*, father). A Hindu title of respect equal to 'Mr.' in English, given in India to educated and wealthy natives or persons of distinction, but used nowadays by Anglo-Indians in a slightly disparaging sense, implying merely superficial cultivation, or simply as designating a native clerk who writes English.

BABOON, băb-ōōn' (OF. *baboin*, Fr. *babouin*, Med. Lat. *babewynus*; cf. Ger. *Pavian*; origin unknown). An African or Arabian cercopithecid monkey of the 'dog-faced' genus Cynocephalus. Baboons are of large size, covered with long, dark hair, and have very large, brilliantly colored callosities upon the buttocks; but are chiefly distinguished by the elongated, blunt muzzle, with the nostrils in the end, giving the profile a resemblance to that of a dog. This is heightened by the prominence of the canine teeth, which in adult males become most formidable tusks, effective against the largest of their enemies among the wild beasts. This physiognomy, often gaudily colored, is repulsive and fear-inspiring, and seems to indicate the fierceness of their character; yet baboons rarely, if ever, have attacked human beings unprovoked. The fore and hind limbs in this group are of similar size, so that they walk easily and gallop swiftly on the ground, and move about rocks with extreme agility; they climb trees with greater difficulty, and as a rule keep on the ground and away from forested regions. All the species are gregarious, assembling in large troops, conducted and guarded by the elders, who are exceedingly watchful against danger. They feed mainly on fruits, berries, buds, roots, and the soft wood of certain trees, but vary this fare with insects, grubs, snails, bird's eggs, lizards, etc. By raiding plantations in troops they may do immense damage to crops, ruthlessly destroying more than they eat, and stuffing their capacious cheek-pouches full of food to carry away. Such bands are too formidable to be easily driven away by half-armed natives. Baboons are rarely hunted for sport, and still less often captured, though partly domesticable when young; and the ancient Egyptians seem to have trained them to pick fruit, etc. Nevertheless, no monkeys are less tractable or fierce than these; and in the safety of large troops they will resist and sometimes vanquish even the leopard. In fighting they usually stand erect, but otherwise keep always upon all fours. Of the various species the following are best known:

Arabian, or Sacred Baboon, or Hamadryad (*Cynocephalus hamadryas*). This is the great ashy-gray baboon, represented upon Egyptian monuments and supposed to have been the monkey to which divine honors were paid. The worship of baboons according to Petrie, was very primitive in Egypt, and was due to the solemn faces of these animals, which gained them credit for great wisdom, and also to their habitual activity at sunrise, leading to the supposition that they were then adoring the sun-god. The body was frequently embalmed, and baboon mummies are still found. It lives in Arabia, but more commonly in Abyssinia and the Sudan, where, in open rocky regions, it congregates in herds sometimes numbering 250, and where its habits have been described at length by Sir Samuel Baker. The huge grizzled mane so characteristic of this species belongs to the old males alone. A closely allied species or variety of Abyssinia (*Cynocephalus doguera*) is yellowish-olive in color.

The Chacma (*Cynocephalus porcarius*) of South Africa is even larger, being about the size of a mastiff, and exceedingly strong; it is still common on the mountain and sea-cliffs of the wilder parts of Cape Colony, going in troops, which might be dangerous to humanity were they not so timid. This species is dark-brown, with long shaggy hair, but without any mane, and the naked part of the face is purplish. The tail is rather more than half the length of the body, and is terminated by a tuft of long black hair. Their food is as miscellaneous as that of other species, but they are especially fond of an iris-like bulb known as *ixia*, which they dig and peel before eating. This is the species most often seen in menageries, but all the others endure captivity

BABOONS

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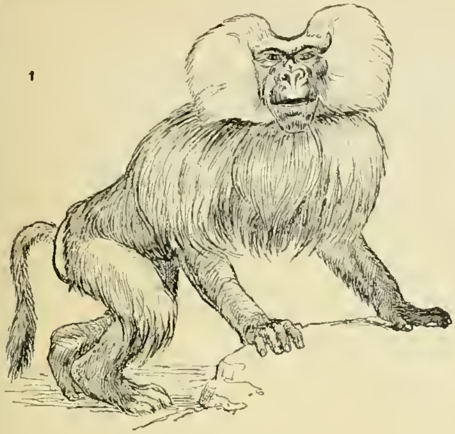

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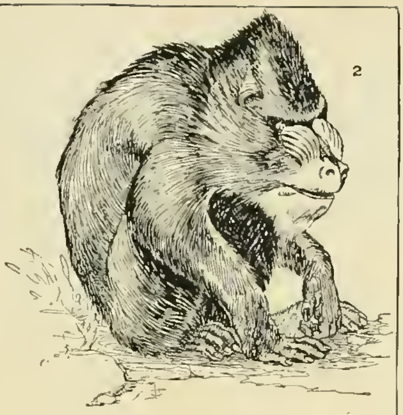

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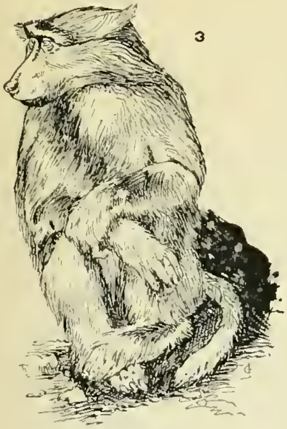

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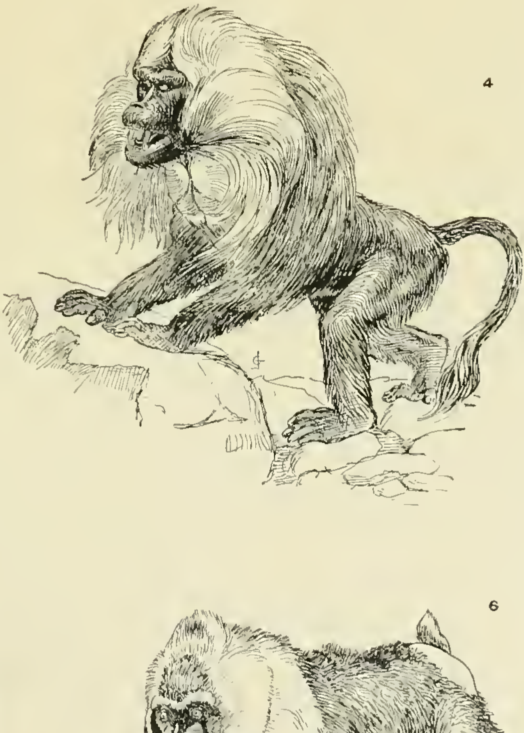

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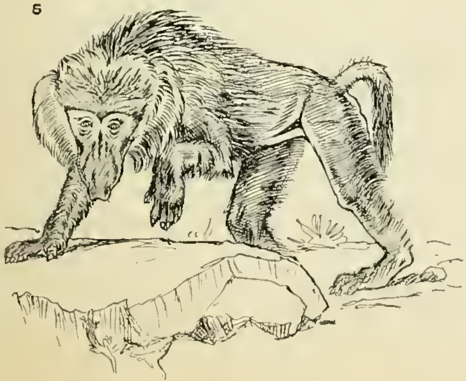

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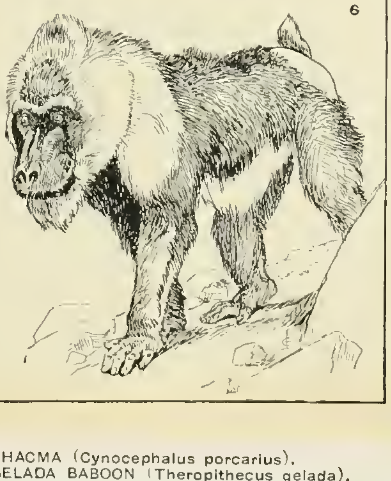

1. ARABIAN OR SACRED BABOON (Cynocephalus hamadryas).
2. MANDRIL (Cynocenhalus mormon).
3. CHACMA (Cynocephalus porcarius).
4. GELADA BABOON (Theropithecus gelada).
5. ANUBIS BABOON (Cynocephalus anubis).
6. DRILL (Cynocephalus leucophæus).

well. In 1902 several of them were to be seen in the New York Zoölogical Park.

Five other species of baboons are limited in their range to West Africa. One is the olive-green ANUBIS (*Cynocephalus anubis*), which is the species reported by Hanno, about B.C. 500, under the name 'gorilla'; another is the edible YELLOW BABOON (*Cynocephalus babuin*); a third the reddish-brown GUINEA BABOON (*Cynocephalus sphinx*), long familiar in the hands of showmen, yet almost unknown in its native state; the others are the hideous, short-tailed drills.

The MANDRILL (*Cynocephalus mormon*) is the largest of all baboons, has comparatively short limbs, a mere stump of a tail carried erect above scarlet callosities, and a massive and powerful body. The head is of enormous size, crested and bearded, and there is scarcely any forehead, while the deeply sunken eyes give a morose expression. The fur about the head, rising into a crest upon the occiput, is greenish black, but the beard is orange yellow, and between them is a huge nose, vastly swollen on each side, folded into ribs colored light blue and divided and tipped with scarlet. The ugliness of its aspect is borne out by the disposition of this brute, which is one of the most formidable and ferocious creatures of the Gaboon forests. Another West Africa baboon is the DRILL (*Cynocephalus leucophæus*), which is somewhat less in size than the mandrill, and lacks the colors and great swellings of the nose, but is otherwise similar to it.

The GELADA 'baboon' is a large, maned monkey (*Theropithecus gelada*), of southern Abyssinia, which has the appearance of a black, clipped French poodle, and the habits and temperament of a true baboon. See APE; MONKEY; and plate of BABOONS.

BA'BRIUS. A Hellenistic fabulist. He was probably of Italian origin, as his name and Latinisms indicate. Toward the end of the First or during the Second Century he worked over a large collection of Æsopic fables in choliambic metre. In the later centuries of antiquity and the earlier Byzantine period, this compilation was very popular, and supplanted all previous collections. Suidas, about the Tenth Century, possessed the work in ten books, but his text was more corrupt than that which we now have. During the Renaissance and modern times, the work existed only in paraphrases and fragments, which were current under the name of *Æsop's Fables*. Tyrwhitt, in his *Dissertatio de Babri* (1776), published a number of verses recovered from the prosaic paraphrases of Suidas; and in 1842 a Greek, Minoides Minas, discovered a manuscript in the monastery on Mount Athos which contained 123 fables, arranged in alphabetical order, showing that at least one-third the original collection had been lost. Fifteen years later Minas brought out 95 additional fables, which are now universally recognized as forgeries. In 1877 Knöll recovered a considerable number of new fables from a manuscript in the Vatican Library; and in 1891, Van Assendelft secured in Palmyra seven wax tablets containing fables not hitherto known. These are now in the library at Leyden. Of editions the best is by Crusius (Leipzig, 1897; edited also by Rutherford (London, 1883).

BABUYAN (bä'bōō-yän) **IS'LANDS** (Malay, 'pig' islands). A group of islands in the Pacific, forming a portion of the northern part of the Philippine Archipelago. They are situated between Luzon and the Batan group, between 18° 40′ and 19° 40′ north latitude and 121° and 122° east longitude. The chief islands of the group are: Kamiguin, 54 square miles; Babuyan Claro, 36 square miles; Calayán, 37 square miles; Dalupiri, 20 square miles; and Fuga, 21 square miles. They are of volcanic origin, with partly extinct volcanoes on the first two. Including the Batan group, the population, according to estimates made by military authorities, in 1899, was 9500. The natives, Ibanags or Cagaynes, are the finest races of the islands. Tobacco is the chief product.

BAB'YLAS, or **BAB'YLLUS,** SAINT (?-250). A bishop of Antioch, from about 237 to 250. He refused to admit to public worship the Emperor Philip, who, to obtain the throne, had murdered the young Gordianus. In the persecutions under Decius, he was cast into prison and there died. His day in the Roman calendar is January 24, and in the Greek, September 4.

BAB'YLON (Gk. Βαβυλών). The Hebrew form and general designation of the city in Mesopotamia, which, from about B.C. 2300, was the capital of the country known as Babylonia (Map: Turkey in Asia, L 6). The etymology proposed for Babylon in the eleventh chapter of Genesis connects it with a stem signifying 'to confuse.' In reality, Babylon is a combination of two words, *bab* = gate and *ilu* = god, and hence appears in Babylonian inscriptions as Bab-ili—i.e. 'gate of God' (or, perhaps, 'gate of the gods'). How much older Babylon is than the date above given, we do not know; but it appears certain that it is far from being the oldest city in Babylonia.

It comes into prominence with the union of the South Mesopotamian States under one head, c.2300 B.C. This was accomplished by Hammurabbi, the sixth member of a dynasty which had its seat in the city of Babylon. From this time on, Babylon becomes the most important centre in the Euphrates valley, and the political supremacy leads also to making the pagan god of Babylon, Marduk, the head of the Babylonian pantheon. The period of greatest glory of Babylon is between B.C. 1800 and the fall of the Neo-Babylonian Monarchy (B.C. 538). During this period, rulers vied with one another in beautifying the city by structures within the religious precinct, and in fortifying it by strengthening its walls. The general building material being clay, repairs in the temples, palaces, and walls became frequently necessary. The chief temple was that sacred to Marduk; but grouped around the seven-staged tower *E-temen-anki*, 'foundation-stone of heaven and earth,' and the temple known as *E-sagila*, 'the lofty house,' were shrines and sanctuaries of numerous other gods.

In B.C. 689, Sennacherib, the King of Assyria, destroyed the city, but under Nabopolassar and Nebuchadnezzar it rose to new glory. It is this second Babylon that became the famous city celebrated by classical writers, around which legends cluster. Extensive mounds covering the site of ancient Babylon are situated about 50 miles south of Bagdad, on the east bank of the Euphrates. They consist of four distinct portions, called by the natives Babil, Mujellibeh el-Kasr, Amran-ibn-ali, covering in all a territory of about 50 square miles. These ruins are now being systematically excavated by German explorers, a beginning having been made in 1899 at el-Kasr, beneath which the remains of the palace of Nebuchadnezzar and the temple E-sagila have been discovered. The results show that, while in Herodotus's account (Book I. §§178-187) there are some exaggerations, the city merited the admiration and envy it excited. Its palaces and temples were huge structures on which the skill of ancient civilization was lavished; its marts brought the products of the entire known world together, and traders of many nations gathered in its streets. The site of the 'hanging gardens'—a creation of Nebuchadnezzar—has been located with tolerable certainty at the northern end of the city; and it turns out that this construction, reckoned among the marvels of the world, was a series of terraces, heaped up of earth-mounds, and laid out as a beautiful park. It is a commonly accepted account that Babylon extended over the west bank of the Euphrates.

For the history of Babylon, which is closely bound up with that of the country of which it was so long the capital, see BABYLONIA.

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BABYLON. A village in Suffolk County, N. Y., incorporated in 1893; on Great South Bay, here crossed by steam ferry to Fire Island, and on the Long Island Railroad, 37 miles east of New York City (Map: New York, G 5). The village is a popular summer resort, having an admirable beach, and is well known to sportsmen for its fishing. Population, in 1900, 2157.

BAB'YLO'NIA. An ancient country in the district of Mesopotamia, included between the Arabian Desert on the west, the Tigris on the east, and the Persian Gulf on the south, while the northern boundary, never definitely determined, may be roughly fixed above the point (near the modern Bagdad) where the Euphrates and Tigris first approach one another. The term Babylonia is not the name given to the country by the Babylonians themselves, but is derived from the name of the capital city Babylon, and because of the importance of the capital is applied in the Old Testament to the entire country, just as, in the north, the city Asshur gives its name to the country Assyria. In the Babylonian inscriptions, the district consists of several divisions, the southern part being in earliest days known as Shumer, the equivalent of the Hebrew word Shinar, the northern part as Akkad (or Accad). Another designation of a portion of the country was Karduniash, and in the days of the Kassite dynasty (Eighteenth to Twelfth Century B.C.) this was extended to include the whole of Babylonia. In the later Neo-Babylonian period, again, the term Akkad was extended to all Babylonia. In the Old Testament we find still another name for all of Babylonia, namely, Chaldæa (Heb. Kasdim) (e.g. Gen. xi. 28; Jer. l. 10; li. 24, etc.). This corresponds to Kaldu, found in cuneiform inscriptions, which properly belongs to the district southeast of Shinar, bordering directly on the Persian Gulf. Its capital was Bit-Yakin, and its more common name was Tamtim, i.e. 'Sea-Land.' Besides furnishing a dynasty (the Kassite) which ruled Babylonia proper, it retained a position of independence at all times, and the founder of the Neo-Babylonian Kingdom, Nabopolassar (c. 626 B.C.) was a Kaldu or Chaldæan. It was this fact which led the Old Testament writers to make Chaldæa an equivalent of Babylonia, and classical writers fell into the same error. While Babylonia was an exceedingly fertile country, its prosperity was dependent upon a careful control of the annual inundations to which the land was subject by the swelling of the Euphrates and Tigris during the prolonged rainy season, which lasts from November till April. This was accomplished by embankments and the building of canals to direct the waters into the fields, so that in the days of her glory Babylonia presented the appearance of a network of canals. The principal products of the country were wheat and dates. Barley, millet, and vetches were also cultivated in large quantities, and likewise the vine and such fruits as apples, oranges, and pears. Among domestic animals of Babylonia may be mentioned camels, oxen, sheep, goats, horses, and dogs; among wild animals, lions, wild oxen, wild boars, and jackals.

The ancient Babylonians were a people of primitive Semitic stock, physically and linguistically, who moved from the Upper Tigris-Euphrates region some 10,000-8000 B.C. into the valley of the lower rivers, and, mingling with peoples of Aryan and Caucasic race, developed, by 5000 B.C., a remarkable urban civilization, curiously anticipating many of the phenomena and problems of modern city life. A number of authorities, Sayce, Schrader, Haupt among others, hold that Babylonian city life, institutions, science, art, literature, and other culture phenomena, including the famous cuneiform writing, were borrowed from a non-Semitic race usually styled Sumerian, or Sumero-Accadian. It is claimed that the inscriptions present evidence that the cuneiform writing was first used for a non-Semitic language. But certain scholars whose opinions are entitled to respect, following the lead of Halévy in 1874, maintain that this so-called Sumerian language was really a sacerdotal dialect of the Semitic. The question is not settled; and it must be admitted that the Sumerian language, if it ever existed, is still imperfectly understood (for further discussion see the article SUMERIAN LANGUAGE). Those who accept Halévy's theory also maintain that the Babylonian culture, including the religion, in its oldest form known to us, is so distinctively Semitic that we must for the present rest content with the hypothesis which ascribes the origin of the culture to Semites or to the predominance of the Semitic element in the population. The language spoken by the inhabitants of Babylonia in times that fall within our historical horizon is likewise Semitic; and the Assyrian spoken in the north presents merely dialectical variations from that of the south.

The non-Semitic elements of the population of this region were almost beyond a doubt related to the primitive Aryan tribes of Asia Minor and the peoples of the Caucasus; and if one is to go beyond the Semites, the Aryans may be, as Brinton suggested (1895), the real fathers of all this culture. The derivation of Chinese civilization direct from the Babylonian is an unproved theory strongly advocated in some quarters. The ramifications of Babylonian culture went all over Western Asia, and even reached out into ancient Europe and Africa. It was indigenous, and not borrowed from the Egyptian.

The writing used in Babylonia, from the earliest period down through the times of the Greek supremacy, was a derivative of a pictorial form, which in the course of time became largely linear. Owing to the peculiar shape taken on by the lines, so that they resembled wedges rather than lines,—a tendency which develops at a comparatively late period and is due largely to the influence on the script of clay used as the common writing material,—the writing is commonly known as cuneiform—i.e. wedge-shaped. (See CUNEIFORM INSCRIPTIONS.) While clay was the ordinary material for writing (for recording commercial transactions, for the religious literature, for correspondence, and largely for official annals), the earliest inscriptions (usually of a votive or commemorative character) are on stone; and in later times we find also metals (gold, silver, bronze, etc.) employed as well as stone. The Babylonian literature, known to us largely through late copies made by Assyrian kings, notably Assurbanipal (see ASSYRIA), is exceedingly extensive and dates back to at least B.C. 2050. It consists largely of hymns, prayers, omens, incantations, but contains also epics, myths, and legends, and for later periods historical annals. Besides, while not properly literature, we have large collections in European and American museums of commercial and legal tablets which formed part of the archives of the temples of ancient Babylonia. Through these tablets, ranging from c.3000 B.C. to the second century B.C., we obtain a remarkable insight into the private and public life, social conditions, legal procedures, and political organization prevailing in Babylonia, while the votive commemoratory inscriptions and annals enable us to trace the political history of the country, though for many centuries the material is yet quite insufficient.

All this material has been brought to light through the excavations conducted during the past fifty years in the mounds that cover the site of the ancient cities of Babylonia. While excavations in Assyria were begun as early as 1842 (see ASSYRIA), the first Babylonian mound was not opened till 1854, in which year Sir Henry Rawlinson began excavating at Birs Nimrud (the ancient Borsippa, q.v.). In 1851-54, a French expedition under the direction of Fresnel and Oppert conducted excavations in the south, while Rawlinson continued work at Nippur, Warka, and Mugheir, though not very thoroughly. During 1878-85 Hormuzd Rassam conducted systematic excavations at various places, notably at Abu Habba (the ancient Sippar) for the benefit of the British Museum, and in 1881 excavations were begun on a large scale by Ernest de Sarzec at Tel-lo for the French Government, which are still being continued. They threw much light on the earlier period of Babylonian history; but through the American excavations, conducted by the University of Pennsylvania from 1887 to date, documents were found which carry us back to a still earlier period. Besides inscriptions, sculptures, ornaments, utensils, seal cylinders, and various other objects, have been found of great importance for Babylonian archæology, but much still remains to be done. In 1899, the German Government began a series of excavations on the site of the city of Babylon itself, which have already yielded rich results, and another American expedition was organized in 1900-01 which proposes to undertake systematic excavations at Mugheir (the ancient Ur of the Chaldees). There remain, however, many important sites which have not yet been touched, and until these shall have been examined and made to yield up the treasures which they hold, the reconstruction of Babylonian history, particularly of the earlier periods, will necessarily be imperfect, and to a certain extent hypothetical.

The earliest period to which the history of the country can be traced back may now be fixed with some degree of certainty at B.C. 4500. At that time, and down to c.2300 B.C., Babylonia was divided up among a varying number of States more or less independent, though at times one exercised a measure of supremacy over the others. Among the cities that enjoy a prominence at this early period are Nippur, Lagash, Ur, Eridu, Erech, and Larsa in the south, and Sippar, Agade, Kish, and Babylon in the north. The oldest ruler now known to us is En-Shag-Kushanna, who calls himself 'lord of Kengi,' by which at that time Southern Babylonia was indicated; but while thus exercising a supremacy over a considerable district, this ruler is far from governing all of Babylonia. There is at this same period an important centre, Kish in Northern Babylonia, which forms a rival to the southern kingdom. An inscription of En-Shag-Kushanna records the latter's victory over Kish. The rivalry, however, continued, for somewhat later we find a king of Kish exercising authority over Lagash. We encounter another interesting personage in this early period in Lugalzaggisi, whose date may be fixed approximately at B.C. 4000. The capital of this ruler's kingdom is Erech (the modern Warka); but, proudly calling himself 'king of the world,' he claims to rule from the Lower Sea (the Persian Gulf) to the Upper Sea (Lake of Van). How far this boast is justified it is difficult to say; but if Lugalzaggisi's rule really included so large a territory, it was not of long duration; for we find, at a period contemporaneous, a continuous series of rulers at Lagash who call themselves kings, and who reach back almost to the time of En-Shag-Kushanna. All through this early period Nippur occupies a rather unique position. As one of the religious centres of the country, it is to the god of Nippur that all rulers pay homage, and it is to him that they ascribe their victories. To control Nippur, therefore, appears to have been an ambition of the rulers—if not, indeed, a necessary condition to their being acknowledged as supreme. The position of the place on the dividing line between northern and southern Babylonia had probably much to do with the prominence that it achieved.

The rulers of Lagash maintained a preëminent position until the rise of a kingdom in the north, whose centre was at Agade, about B.C. 3800. The period appears to have been on the whole one of peace, during which strides were made in the arts and civilization in general. One of the chiefs, more especially Gudæa (c.3000 B.C.), appears to have been a great builder, as the remains of his palace and temples at Tel-lo indicate. Dolorite was imported from Arabia for the production of statues of the king of enormous size, while gold and precious stones were likewise imported for the manufacture of objects of art; but these kings also showed prowess in war. We have a splendid stele set up in a temple at Lagash by Eannatum (c.4200 B.C.) commemorating his victory over his enemies. On one side Eannatum is pictured as standing in his chariot, leading his troops against the enemy. The battle-field is portrayed in another section, on which vultures are depicted in the act of mangling the corpses of the King's opponents. It is about B.C. 3800 that Agade comes to the fore under the leadership of Sargon I., and from this time on, Lagash sinks to secondary importance. Its rulers become for a time vassals to Agade, though they subsequently regain their independence. About 1000 years after Sargon, we find a dynasty with its centre at Ur, claiming control as kings of Sumer and Accad, over both northern and southern Babylonia. Of the two kings of this period known to us, Ur-gur and Dungi, both are distinguished as great builders, restoring and enlarging temples in the various religious centres of the land. The commerce of Babylonia at this period also assumed large dimensions, which may be taken as another indication that the rulers were devoted to internal improvements rather than conquest. The rivalry, however, among the cities or States continued, and for a time we find Isin taking the place of Ur as the controlling centre. Ur recovers its former position c.2400 B.C.; but about this time Babylon comes to the front, and within 100 years a mighty warrior, Hammurabbi, succeeds in gaining for his capital the rank once occupied by Erech, Lagash, and Ur; and, what is more, from this time on, while the control frequently changes hands, the power passing through no less than eight distinct dynasties, Babylon remains the centre until the overthrow of the Neo-Babylonian Kingdom by Cyrus, in B.C. 538. Hammurabbi, after making his position secure, takes up the legacy of the past and becomes a patron of civilization. He perfects the canal system of the country, and lays the foundations for the future glory of the city of Babylon.

About the year B.C. 1782, Babylonia is conquered by a people known as the Kassites, who advance from the mountain districts of Elam and Media. For no less than 500 years they succeed in maintaining themselves as rulers, after which they are replaced by native rulers, who hail from Pashe. About B.C. 1050, another change takes place, and rulers from the 'Sea Land,' in the extreme south, seat themselves on the throne of Babylon. The names of these kings are Kassitic, so that it would seem that a section of this people who had, perhaps, been driven to the south, succeeded in regaining control. It was a period evidently of great internal disturbance; for within fifty years no less than three changes in dynasties take place, and for a short time indeed Elam obtains control of Babylonia. A factor which was, no doubt, of importance in bringing about this state of unrest, was the constant interference in Babylonian affairs on the part of the Assyrian Kingdom, that had meanwhile developed great military activity (see ASSYRIA), and that finally succeeded in obtaining practical control of the south, while according to it a certain measure of independence. About the year 1026, native rulers once more sit on the throne of Babylonia, and from now on till the rise of the Neo-Babylonian Kingdom (B.C. 626), the only violent changes are those due to the alternating periods of friendship and hostility with Assyria. After the Eleventh Century, the time when Babylonia could take the initiative of conquest had definitely passed away, and her development from now on lay wholly in the domain of commerce, the arts and sciences. Her chief troubles came from Assyria, and whenever changes took place in the north, the south was certain to feel the effects. From time to time ambitious leaders arose, who, by a combination with the enemies of Assyria, tried to throw off the Assyrian yoke; but all such efforts, after a shorter or longer period, failed, and generally, after successfully quelling an uprising, the Assyrian monarchs themselves took control of Babylonian affairs until things had quieted down sufficiently to warrant the appointing of a governor over them. It was from Chaldæa that at last a leader came who—as, with the death of Assurbanipal, Assyria rapidly declined—seized the opportunity to combine with the rugged Scythian hordes, coming from the north, for the purpose of striking a fatal blow at Assyria. The plan succeeded, and as Nineveh fell, Babylon succeeded for a short time in replacing her as mistress of the ancient world. Nabopolassar, the founder of the Neo-Babylonian Monarchy, handed over the succession to his son Nebuchadnezzar about B.C. 604, who felt himself strong enough to take up the rôle of Assyria as a world conqueror. He checked the advance of Necho II. of Egypt (who had formed a plan to secure control of Syria and Palestine), conquered Jerusalem and Tyre, and boldly advanced against Egypt, which he succeeded in putting under his control for a short time.

The strength of the new monarchy seems to have expended itself in Nebuchadnezzar's reign. After 43 years of incessant warfare, the throne passed in 561 into the hands of his son, Evil-Merodach, who after two years was assassinated in the course of a revolt led by his own brother-in-law, Neriglissar. In 555, Labashi-Marduk, who succeeded his father, was murdered by his nobles, after reigning for nine months, and Nabonidus mounted the throne. He devoted himself to the rebuilding of temples in various centres, but aroused the opposition of the priests of Babylon by attempting to introduce changes in religious rites. But even if he had been successful in reuniting the divided interests of the country, Babylonia would not have been strong enough to resist the attack of the new force that now made its appearance. In the year B.C. 538 Babylon yielded without a struggle to Cyrus, who was hailed by the priests of Marduk as a deliverer, and who knew how to avail himself of the situation by restoring the old religious order, and by adopting a general policy of mildness, calculated to reconcile all parties. Persia retained control of Babylonia until the advent of Alexander the Great, by whose conquests Greek supremacy was established, which was subsequently exchanged for Parthian supremacy. Alexander made Babylon his capital, and it was there he died. After this the glory of Babylon departs. She rapidly sinks into insignificance, and, long before the Arabs overran Mesopotamia, all traces of Babylon and of the great centres of Babylonia had disappeared.

It will be apparent, from this sketch, that on the whole Babylonia was not a conquering power, but one that promoted civilization and the arts of peace. As a consequence, it is in the south that commerce takes on large proportions; that a noble architecture arises; that a notable literature is produced, and that religious thought attains a remarkable degree of development. As already set forth in the article on Assyria (q.v.), the culture of Mesopotamia is distinctly a Babylonian product; and while, in the great temples at Babylôn, Nippur, Sippar, Erech, Ur, etc., the old incantation rituals continued in force, there grew up by the side of the old ceremonies a view of divine government which, manifesting itself in hymns and prayers that breathe a lofty spirit, approaches close to a monotheistic conception of the universe, such as is found in the writings of the Hebrew prophets. The old local gods in the Babylonian cities do not disappear, but in the course of time they group themselves as a kind of court around the head of the pantheon, Marduk, to whom attributes and powers are assigned that seem to indicate a concentration of the powers of all the gods in his person.

For bibliography, see the article ASSYRIA. Consult also: Winckler, *Die politische Entwickelung Babyloniens und Assyriens* (Leipzig, 1900), which is a capital sketch of the general course of Babylonian and Assyrian history; ibid., *Die Völker Vorderasiens* (Leipzig, 1899); Beick, *Die Keilinschriften in der Tigris-Quellgrotte* (Berlin, 1894-1901); Peiser, *Skizze der babylonischen Gesellschaft* (Berlin, 1896); Radau, *Early History of Babylonia* (Oxford and New York, 1900); Hilprecht, *University of Pennsylvania Expeditions to Babylonia, Bulletins* (Philadelphia, 1898-1901); Sayce, *Babylonians and Assyrians* (New York, 1899); Brinton, *Protohistoric Ethnography of Western Asia* (Philadelphia, 1895).

BAB'YLO'NIAN ART. The style of art current in the valley of the Tigris and Euphrates, from the beginning of historic civilization until the time of the Median Conquest, in about B.C. 500, during a period of 4000 years or more. Its interest is increasing from the fact that it appears to represent the earliest artistic effort of mankind in many branches, antedating the culture of Egypt by a considerable period. The Babylonian temperament was, like the Egyptian, traditional, and the changes in style were few and conditioned largely by degrees of mastery over technical processes—over materials and implements. It was essentially a religious, priestly art, and its monuments can hardly be appreciated without a knowledge of Babylonian literature, mythology, manners, and customs. So far as can be judged from the very insufficient excavations, the periods of artistic development were: (1) The pre-Sargonic era of primitive art, crude, especially in its sculpture, and with imperfect technical attainments. It extends to B.C. 3800. (2) The Age of Sargon, the golden era, distinguished for broad style with exquisite finish and perfection of technique. It lasted from B.C. 3800 to 2800. (3) After the interval of Elamite invasion came the Age of Hammurabi (B.C. 2200-1700), the silver era, when Babylon was the centre of Mesopotamian civilization, when art was somewhat more stereotyped and careless. (4) The Kassite Age (from c.1700 to c.1000) with gradual complete decadence under a semi-barbarous dynasty, with loss of all reality and life, and final subservience to Assyrian art. (5) The Renaissance, under Nebuchadnezzar, when the ancient style of the best age, that of Sargon, was reproduced as closely as possible (c.600 to 500 B.C.). The researches and excavations that have disclosed what we know of Babylonian art are detailed under article BABYLONIA. The Louvre Museum is the only one in Europe that contains many of the larger works; other collections being confined to terra-cottas and carved boundary-stones (British Museum, Berlin, etc.), and to engraved stones (Louvre, Bibliothèque Nationale, Paris; British Museum; Le Clercq collection; Metropolitan Museum, New York; etc.). The Museum of Constantinople is beginning, however, to receive a number from the latest excavations of Tel-lo, Babylon, Nippur, etc. The characteristic forms of Babylonian art are its brick architecture, with heavy masses of masonry and small vaulted interiors, with its lack of columns or piers or carved details, and its use of color surface decoration of faïence, fresco, and hangings: its development of the industrial arts, especially of bronze casting, terra-cotta figurines, and reliefs and glyptics, or the cutting of hard and precious stones. Hitherto it is from these small objects, many thousands of which have been found, more than from the few pieces of large statuary and reliefs, that the character and continuity of Babylonian sculpture can be judged. (See GLYPTIC.) The artistic influence of Babylonia was widespread and strong. It is tolerably certain to have been exercised in the formation of Egyptian and Elamite art at a very early date. The comparison of the brick-making of the temple-pyramids and the statuary of the two countries are among the indications for Egypt. The few researches for pre-Median Elam prove the same thing for sculpture, but excavations have not yet gone deep enough to show what was the primitive Elamite architecture. Then, the Babylonian conquests on the Mediterranean carried Babylonian art to Syria, even to the island of Cyprus, and into Asia Minor among the Hittites. The Phœnicians not only copied it but carried it westward. Considering that Assyrian art, also, was substantially a branch of Babylonian, it is clear that Babylonian art was not only supreme throughout Western Asia, but bore directly upon North Africa and the Pelasgians and other Ægean peoples, and therefore upon early Greek art. Its influence survived it in Persia and, through it, in the later Oriental art of Parthians and Mohammedans. Even China and India felt it.

ARCHITECTURE. Architecture as a fine art was first practiced in the valley of the Tigris and Euphrates, in the region we call Babylonia. Here were worked out the earliest forms of religious and civil structures. Everything had to be invented—materials, tools, methods, architectural forms, from the merest details to the broadest compositions. It was the same with the other arts utilized to assist in this development of architecture. The material used was brick, sun-dried and kiln-baked. The obvious reason for this was the absence both of stone quarries and of forests for timber. The tools required were therefore extremely simple; and the forms of ornamentation and composition were conditioned both by the material used and the physical surroundings. The absence of stone for walls and columns and of wood for timbers forced the builders to make their walls thick and their halls narrow, so that they could be spanned by brick vaulting. Thus, at the very beginning the arch and vault were invented—both the false corbel arch with straight courses, and the true voussoir arch. Both pointed and round arches were used in barrel vaults. Since the country was very flat, it was difficult to lend impressiveness to buildings. In almost every other country natural eminences could be found, but here artificial platforms had to be constructed to make the buildings bulk large in the landscape. On this immense stage arose solid artificial mounds supporting single buildings or groups. The principal mound was always that of the temple, which was in the shape of an immense stepped truncated pyramid. At Babylon the 'Birs Nimrud' is reckoned to have been over 250 feet high. The tower varied in the number of its stories from three to seven. The ascent was made in various ways—either by a continuous inclined ramp around the receding stories, or by a combination of internal staircases through the mass. On the way up were shrines, and the summit was crowned by the principal sanctuary. The chambers, however, were few and small. The stories appear to have been colored differently. In many temples the builders used brick dipped in colored enamel, to signify that each particular story was consecrated to one of the planetary deities. These brick were stuck into the mass of sundried brick, and formed both a preservative and a decoration. Moldings were used as well as color. The broad surfaces were broken into panels, often framed by pilasters or groups of palm-stem shafts, and even by series of convex flutings. The sites of nearly all the great Babylonian cities have been located, but natural disintegration has reduced them all to masses so unpromising and shapeless, without traces of construction, as to have discouraged explorers. Now, however, the buildings of Sirpurla, Nippur, and Babylon itself are being brought to light, and something has been done at Lippara, Eridu, Larsa, Ur, and Erech. At Tel-lo (= Sirpurla) the French have unearthed a royal palace dating back to about B.C. 5000, but rebuilt by King Gudêa. Its platform was 12 meters high, 200 meters long, and 50 meters wide, and was reached both by a stairway and by a ramp. The palace itself is an elliptical rhomboid, almost like a barrel. The outer walls are decorated with pilasters and semi-columns. The rooms, 36 in all, are grouped around three courts, presumably, as in the later Assyrian palaces, the centres of the three sections—state apartments, harem, and dependents' quarters. The decoration given to these apartments is unknown. In other sites brilliantly enameled cones were stuck into the soft bricks to form varied patterns. Far larger and more sumptuous palaces existed in other Babylonian cities, but they have not yet been excavated. Compared with our rapidly growing knowledge of the history, religion, and literature of the Babylonians, our knowledge of their architecture is small. No history of this architecture can yet be written. It would appear as if the reconstructions by the Neo-Babylonian kings, such as Nebuchadnezzar, of the ancient sacred shrines, such as the temples of Babylon and Ur, were substantially in the same style as the original structures built 2000 or 3000 years before. See BABYLON; BABEL, TOWER OF; NIPPUR.

SCULPTURE AND MINOR ARTS. The use of sculpture in relief and in the round appears contemporary with the earliest architecture. The only group of works in historic sequence yet found is that from the mounds of Tel-lo. Many of these sculptures are carved with historic and dedicatory inscriptions of the rulers which make their date indisputable. There are very crude reliefs of the period c.4500-4000, including the famous battle and funeral scenes of the "Stele of the Vultures"; there are reliefs more delicate in technique and advanced in form, belonging to the age of Sargon and Naramsin (3800-3700); then a series of colossal statues in very hard stone of the time of King Gudêa, a little later, resembling in technique the statues of the ancient empire of Egypt, though clumsier in proportion than these. Statues, both standing and seated, steles, friezes, carved basins, and other classes of reliefs show that the Babylonians practiced sculpture in more varied form than their successors, the Assyrians; but so far as can be judged by the monuments yet discovered, they never attained to the skill of the Assyrians in low relief. There was a greater use of religious and mythological scenes, but the annals of the kings also supplied frequent themes. Of their ability to render genre scenes and animal life, in which the Assyrians were later successful, we can judge only from a few examples, such as some later terra-cottas of animals and the seal cylinders. The treatment here is realistic and with good treatment of surfaces, without the sharpness of line and energy of Assyrian work. It is only from the minute sculpture of the cut gems and stones of the cylinders and seals that some idea of the historic development of Babylonian sculpture can be obtained during its course of over 4000 years. Every Babylonian was supposed to wear his seal and use it as his signature on all occasions, impressing it on the soft clay used as the universal writing material. The variety of the scenes carved upon them is wonderful, no two being exactly alike. Large collections of these small works have been made in Europe and America. The largest are those of the Louvre, the Bibliothèque Nationale, in Paris; of M. Le Clercq, also in France; of the British Museum; and of the Metropolitan Museum, New York. Several thousand can now be studied, and they illustrate the mythology, theology, religious rites, manners, and customs of the country better than any other works that have been found. Some are of extremely primitive workmanship, often executed principally with the drill, round holes of various sizes representing heads, shoulders, elbows, hands, hips, knees, and feet, connected often by lines. Others, especially those between the time of Sargon (3800) and Ur-gur (2700), are wonderful in their technique, soft textures, and perfect rendering of detail. Such subjects as the adventures of Gilgamesh—the Babylonian Hercules—the fight of Merodach and the Dragon, or Order and Chaos, and the adoration scene of some patron god, are the most frequent.

Other branches of sculpture are less well represented by discoveries, but sufficiently to prove considerable proficiency on the part of the artists. Precious metals were embossed and chased, as shown in the famous silver cup of Tel-lo, now in Constantinople. Bronze figurines were cast at an early date with considerable skill, many being yielded by the Tel-lo excavations. Terra-cotta sculptures were made from molds in relief and in the round, and afterwards finished by hand. A very original form of such work was the building up of large figures in relief, or the round out of separate tiles molded and then enameled in brilliant colors. Recent excavations at Babylon have brought to light an entire royal avenue leading through the city, flanked by colossal lions of this technique. The palace of Sargon at Khorsbad, and the palace at Susa, show that the Assyrians and Persians imitated this branch of art.

The best restorations and descriptions are: "La Chaldée et l'Assyrie," Vol. II. of Perrot and Chipiez, *Histoire de l'art dans l'antiquité* (Paris, 1884), translated by Armstrong, *History of Art in Chaldea and Assyria* (London, 1884). A good brief account is given in Babelon, *Manuel d'archéologie orientale* (Paris, 1888), translated by Voetts, *Manual of Oriental Antiquities* (New York, 1889). The Tel-lo-Sirpurla discoveries are described briefly in Henzey, *Un palais Chaldéen* (Paris, 1884), and fully in De Larzec and Henzey, *Découvertes en Chaldée* (Paris, in course). The best historic and scientific treatment of gems is in Menant, *Les pierres gravées de la Chaldée et de l'Assyrie* (Paris, 1884), and the best series of illustrations and detailed descriptions in Menant, *La collection Le Clercq* (Paris, 1888). For explorations, consult: Loftus, *Travels and Researches in Chaldæa and Susiana* (London, 1853); Peters, *Nippur*, (New York, 1897).

BAB'YLO'NISH CAPTIV'ITY, or **BABYLO'NIAN EX'ILE.** The name given to the deportation of Judeans to Babylonia by Nebuchadnezzar at the time of the conquest of the Judean Kingdom. The policy of deporting the principal inhabitants of conquered districts, as an effective means of preventing uprisings, appears to have been begun by the Assyrian monarchs, who in their inscriptions frequently refer to the execution of such a measure. So in B.C. 738, Tiglathpileser III. carried away portions of the trans-Jordanic Hebrew tribes, and at the time of the destruction of Samaria, Sargon (B.C. 721) took many captives to Assyria, and replaced them by colonists from various towns of Babylonia. The kings of the Neo-Babylonian period adopted this policy, and accordingly Nebuchadnezzar, at the time of the defection of Zedekiah (B.C. 597), carried Jehoiachin the King, the royal household, the princes and chief men to Babylonia; and ten years afterwards, when Jerusalem was finally destroyed, a second and even larger deportation took place (II. Kings xxv.). Yet it must be borne in mind that the majority of the inhabitants remained in the land, even when we subtract those who went into a voluntary exile in Egypt. Those who were taken to Babylonia were settled in various parts of Southern Mesopotamia, and it would seem that the favorable conditions existing in Babylonia induced many to leave Palestine, where the long ravages of war had brought on great distress, and to join their brethren in the Euphrates Valley. The captivity must not, therefore, be regarded as a condition of hardship. As a matter of fact, the Jews were allowed, as were all foreigners in the Babylonian domain, the greatest possible freedom, and soon became assimilated to conditions prevailing in Babylonia. Instead, however, of cultivating the soil, as they had done in their own country, they entered upon commercial life; and this change from agricultural pursuits is, perhaps, the most significant feature of the Babylonish Captivity, which profoundly influenced the future fortunes of the Jews. Traces of settlements of Jews in Babylonia may be seen in the numerous Jewish names that appear in the so-called contract tablets found in Babylonia, belonging to the Neo-Babylonian and Persian period. From these and other sources we know that many of the Jews acquired riches in Babylonia; and, on the whole, all lived in ease and comfort, if not in prosperity.

So complete was the assimilation to Babylonian ways of life that when, after the advent of Cyrus (B.C. 538) permission was given to the Jews to return to their homes in Palestine and to rebuild the Temple, only a comparatively small number availed themselves of the opportunity. Only the pious and zealous were impelled to take up the pilgrim's staff, and the sad fortunes encountered by those who did return served to discourage emigration from Babylonia on a large scale.

The period of the exile was a most important epoch in the religious life of the people. The downfall of Jerusalem was looked upon as a punishment sent by Jehovah for the people's sins in not following the injunctions of the purists, who objected to all foreign ingredients in the Jehovistic cult. The cause of the Prophets was thus strengthened by the natural catastrophe, and the new spirit manifested itself during the exile by the literary activity which now began and which gradually transformed the annals and traditions and all literary productions of the past into one grand illustration of the fundamental principle of the religion of the Prophets, that there was no god like Jehovah, and that His people Israel, who were bound to Him by the Covenant at Sinai, prospered when they were faithful to Jehovah, and that all distress, defeats, and misfortunes that mark Israel's history were punishments sent because of disobedience to His will. It was important, therefore, for the future to know exactly what was the will of Jehovah, and hence prophets like Ezekiel set themselves to work preparing codes regulating forms of worship and the conduct of life. The upshot of this movement is the production of an elaborate code by Ezra, which is promulgated by him and Nehemiah in B.C. 444 as the eternal law of the land, and which was subsequently combined with the legendary and the historical traditions of Israel to form the present Pentateuch, though it should be added that the Pentateuch itself is but a part of one great final compilation which, extending from Genesis to the end of the second book of Kings, embraced therefore, besides the Pentateuch, Joshua, Judges, Samuel and Kings, the legends, the traditions, the law and the annals of the Hebrews—all viewed from the position of post-exilic Judaism as finally established on the basis of Ezra's Code. See EZEKIEL; EZRA; JEWS; PENTATEUCH.

The name 'Babylonish Captivity' is also frequently applied in Christian Church history to the residence of the Popes at Avignon, from 1309 to 1376.

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BACACAY, bȧ-kä'kī. A town of the Philippines, in the Province of Albay, Luzon. It is situated on the Gulf of Albay, about 11 miles north of Albay, the capital. Population, 10,550 (Map: Philippine Islands, H 6).

BACALAO, bä'kȧ-lä'ō. (1) A name applied in the West Indies to a grouper (*Mycteroperca falcata*), also called scamp and abadejo, and common in the markets. (See GROUPER.) (2) Formerly this word was applied in Europe to weather-cured codfish. "Among the Greeks the large codfish were called bacchi, from bacchus, a rod . . . by the Iberians the dried cod were called bacalaos from baculeum, a small stick. The rod held by Mercury was called a baculeum" (Brevoort, quoted in Goode's *Fishery Industries*, Sec. 1, Washington, 1884, page 200). The term is used in all the accounts of the early fishing expeditions from Europe to the Banks of Newfoundland, and has long survived. A letter from Madrid to *The Remembrancer* (London, 1776), recounting discoveries on the coast of California, mentions the taking there of "cod, known in Spain by the name of *bacallao*."

BACARRA, bȧ-kär'rȧ. A town of Luzon, Philippines, in the Province of Ilocos Norte. It is situated three miles north of Laoag, and has a population of 13,735 (Map: Philippine Islands, E 1).

BAC'CANAR'ISTS, or properly **PAC'CANA'RISTS**. The followers of Nicolao Paccanari, who founded in Rome, in 1797, a society similar to that of the Jesuits, which had been suppressed that year, and intended to carry on its work. So when the Jesuits were reëstablished in 1814 the Baccanarists were united to them. Their title was 'Regular Clergy of the Faith of Jesus.'

BACCARAT, bä'kȧ'rȧ'. The chief town of a canton, Arrondissement of Lunéville, in the Department of Meurthe et Moselle, France, on the river Meurthe, 15½ miles southeast of Lunéville by rail. It is noted for its extensive plate-glass and crystal factories, an industry established in 1765. Population, in 1896, 6772.

BACCARAT, bȧ'kȧ'rȧ' (Fr., of unknown origin). A game of cards, said to be of Italian origin, and to have been introduced in France in the time of Charles VIII. The game is played for money between one of the players, who is called the banker, and any number of others. Each of the face or court cards, in all countries except America (where the face-cards and tens have no value, and the naturals are 8 and 9), counts 10; in others, according to the number of their spots. Bets having been made, two cards are dealt by the banker to each player, including the banker himself, and if more than one pack of cards is necessary to deal round to all the players, more are used. Each player's aim is to make the value of his cards foot up the total of 9, 19, 29, or as near these totals as is possible. Any player has the privilege of *standing*, or remaining *content* with the two cards dealt to him at the outset by the banker, or he may call for more. When any player has a *natural*—that is, a sum making 9, 19, or 29—he declares that it wins, and the banker has to pay all who hold hands of higher value than his own, receiving payment from all whose hands are inferior. The principal advantage in the game lies with the office of banker, which in social games is usually determined by cutting the cards. The banker retains his office until defeated by all the players in the same hand, in which event he surrenders the bank to the player winning on the highest hand.

BACCHÆ, băk'kē. (1) A name given to the women companions of Bacchus in his journeys through the East, and to the female participants of the Dionysian festivals. They were crowned with wreaths of vine-leaves, wore fawnskins, and carried the thyrsus. (2) A brilliant play of Euripides, abounding in tragic situations and splendid spectacles. Its subject is the advent of Bacchus at Thebes, where Pentheus, with his mother and sisters, opposes the worship of the gods. In punishment the mother and sisters are made mad, and Pentheus, driven out into the mountains, is torn in pieces by them.

BACCELI, bȧ-chĕl'lē̇, GUIDO (1832—). An Italian physician and statesman; born at Rome. He studied medicine at the University of Rome, where he later successively filled the chairs of medical jurisprudence, pathological anatomy, and clinical medicine. In 1874 he was elected a member of the Chamber of Deputies, and in 1880 was made minister of public instruction. In the latter capacity, he projected a thorough reorganization of superior instruction in Italy; but his plans met with decided opposition, in consequence of which he resigned his portfolio in 1884. In 1890 he was made a senator, and subsequently, from 1893 to 1896 and from 1898 to 1900, again acted as minister of public instruction. His published writings include *Patologia del cuore e dell' aorta* (3 vols., 1864-67), besides clinical lectures on malaria and several other works on medical subjects.

BACCHANALIA, băk'kȧ-nā'lĭ-ȧ. See BACCHUS.

BACCHANTES, băk-kăn'tēz (Lat. nom. pl. pres. p. of *bacchari*, to celebrate the festival of Bacchus). Devotees of Dionysus (Bacchus), both men and women, who engaged in orgiastic worship of the god. See BACCHUS.

BACCHIDES, băk'kĭ-dēz. One of the comedies of Plautus, presented in B.C. 189. The early scenes are missing, having disappeared about the Fifth Century A.D.

BACCHIGLIONE, bäk'kē̇-lyō'nē̇. A river of Northern Italy, rising in the Alps. It flows eastward, traversing Vicenza, and after a course of about 80 miles, enters the Gulf of Venice. It is canalized as far as Padua, whence a canal connects it with the town of Este and the river Adige.

BACCHUS, băk'ŭs (Gk. Βάκχος, *Bakchos*). Also called Dionysus (Gk. Διόνυσος, *Dionysos*) by the Greeks. A god who originally belonged to the great group of vegetation-spirits, whose worship was widely spread among European nations. As such his coming in the early part of the year was received with joy and revelry, while his departure or death was also celebrated at the winter season. In some cases the old spirit is regarded as dying that the new one may be born, and there is some reason for believing that this feature was also found in the rites of Dionysus. The god never lost his early connection with the flourishing of vegetation and with fruitfulness generally, but he came to be associated more and more closely with the vine and its inspiring produce. His worship was exceedingly widespread, and appears in manifold local forms and with large admixtures of foreign elements. Indeed, some of the myths seem to indicate the presence of a god of light as well as a true chthonic deity. There is also much in the worship and legends that indicates a foreign origin for the cult, though there can be no doubt that many features, such as the satyrs, are purely Greek. So widely different are the stories and so varied the myths in which the god appears, that only some of the more important can be indicated. The common legend of his birth seems to have been that of Thebes. Zeus loved Semele, the daughter of Cadmus; but the jealous Hera induced her rival to beg the god to appear to her in all his splendor. Naturally, the mortal was consumed by the thunderbolt; but Zeus saved her unborn child, and sewed it in his thigh, whence in due time it was born. The infant was intrusted to Hermes, who delivered him to the nymphs of Nyssa, in Thrace. Here he discovered and taught the powers of the grape, and headed a band of nymphs and satyrs, the so-called Thiasos, with whom he wandered over the earth, communicating his new gift to men, blessing those who received him gladly, and punishing his enemies. For the legends have much to tell of opposition to the new worship. So Lycurgus, King of Thrace, drove Dionysus in terror to the depths of the sea; but later perished miserably. The story of Pentheus, King of Thebes, who cast Dionysus into prison, but was himself later torn in pieces by his own mother, Agave, and the Theban women who had been driven by frenzy to celebrate the rites of the god, forms the subject of the *Bacchæ* of Euripides. There is much to indicate that in these stories we have really versions of the death and return of Dionysus himself. In friendship Dionysus visits Icarus at Icaria, in Attica; but even here the story ends in death, since Icarus is killed by peasants, who fancy themselves poisoned by his new gift of wine. Another instance of his power is furnished by the story of the transformation into dolphins of the Tyrrhenian pirates, who bound him in order to carry him to Italy. It is told in a Homeric hymn, and also in the marble reliefs which decorate the choragic monument of Lysicrates in Athens. Legend also makes him wed Ariadne (q.v.), when abandoned by Theseus on the island of Naxos. The conquering tour of Dionysus was greatly extended under the influence of Alexander's conquests; and the god's subjection of the East and India became a subject of later poets, and is preserved to us in the epic of Nonnus (q.v.).

In art, two types prevail. In the earlier period the god is represented as bearded and fully draped, and this type was not unknown in later times, when it was sometimes called 'the Indian Bacchus.' From the middle of the Fourth Century B.C., another type steadily gains in popularity, representing the god as a beardless youth, nude or wearing only the fawnskin, or *nebris*. The chief attributes of the god are the thyrsus, or rod ending in a pine cone, and wreathed with ivy, and the great two-handled drinking-cup (the cantharus). He is often accompanied by a panther, and the bull and goat were closely associated with his worship. Naturally, as a god of vegetation and the vine, Dionysus was associated with Demeter, Core, and the Eleusinian Mysteries (q.v.), where he bore the name Iacchus. In the mystic worship which grew up in the Sixth Century B.C., under the name of Orpheus (q.v.) Dionysus Zagreus played a prominent part, and no doubt Orphic influence helped to produce the confusion of elements which is so marked in all this cult.

In the worship of Dionysus two distinct forms may be traced. The one appears most distinctly in the Attic festivals, especially the country Dionysia. It is essentially a joyous but rude and boisterous vintage festival, celebrated by men, and abounding in mummeries and coarse jests. Its connection with vegetation and fruitfulness is shown by the phallic procession, which held a prominent place in the celebration. (For an account of the Attic Dionysia, see GREEK FESTIVALS.) The other form of Dionysiac worship was highly orgiastic, and celebrated by women, at the time of the winter solstice in alternate years; hence called the Triateric Dionysia. The celebrants, in Greek Mainades, or Mænads, wandered among the mountains, indifferent to the cold, wearing fawnskins and carrying the thyrsus and torches, for the chief rites were held at night. The god was said to be lost, and was sought with wild cries. The culmination of the orgy was in tearing in pieces fawns, kids, and other animals, and devouring the raw flesh in honor of the god. We even hear of human victims being rent asunder. These rites were thought to be an endeavor to arouse the dead or sleeping god; but it is also clear that originally the slain animal was the god, who was killed to be reborn. It is a common feature of primitive religions for the worshiper to partake of the god, especially if it be a deity connected with vegetation or fertility. These orgiastic rites were especially associated with Thebes and Delphi, though we hear that even Athenian women went to Mount Parnassus to join in this fierce and bloody worship. In later times the mysteries celebrated under the name of Dionysus became more and more occasions for intoxication and gross licentiousness.

The *Bacchanalia* were introduced into Rome early in the Second Century B.C., and at first were celebrated on three days of the year by women only. Later a priestess opened the mysteries to men, introduced evening celebrations, and greatly increased their frequency. The gathering soon became suspected of gross immoralities; and in B.C. 186, the Senate ordered the consuls to arrest the priests, and forbid further meetings of the association throughout Italy. The result of the judicial inquiry was that the majority of the members were sentenced to death, and others to life imprisonment, while by a decree of the Senate all such associations were forbidden in Italy. The decree (*Senatus Consultum de Bacchanalibus*) has been preserved in a single copy. *Corpus Inscriptionum Latinarum*, I., 196-X. 104.

On the vegetation spirits and their worship, consult: Mannhardt, *Wald und Feldkulte* (Berlin, 1875-77). On Dionysus, consult: Roscher, *Lexikon der griechischen und römischen Mythologie*, Vol. I. (Leipzig, 1884-90): Preller-Robert, *Griechische Mythologie*, Vol. I. (Berlin, 1894); and B. I. Wheeler, *Dionysos and Immortality* (Boston, 1899).

BACCHUS AND A′RIAD′NE. A painting by Titian, founded on the Greek myth of the marriage of Dionysus to the wife of Theseus, after she had been deserted by the slayer of the Minotaur upon the Island of Naxos. The picture hangs in the National Gallery, London. Set in a background of thicket and sedge and ocean, Ariadne is turning away, filled with maidenly confusion, as the leopard-drawn chariot, surrounded by satyrs and mænads, descends, bearing the god. Its date is 1523.

BACCHYLIDES, băk-kĭl′ĭ-dēz (Gk. *βακχυλίδης, Bakchylidēs*). A Greek lyric poet, born at Iulis on Ceos, at the end of the Sixth Century, B.C., who flourished between B.C. 490 and 460. He was a nephew and pupil of Simonides and the rival of Pindar, according to well-established tradition. He lived for a time at the court of Hiero, tyrant of Syracuse, who greatly admired him, and whom he celebrated in three of his poems. When exiled from his native town, presumably by political opponents, Bacchylides resided in Peloponnesus, and records of many of his victories in dithyrambic contests at Athens have been preserved. As the youngest, he was placed last in the list of nine lyric poets deemed worthy of immortality by the canon of the Alexandrian critics, who admired his grace and sweetness. He shared the fate of the canonized poets, whose works, with the exception of Pindar's, were all lost to posterity. Only 107 lines were preserved in quotations, the longest one of 12 verses only. In 1897, the British Museum acquired, in Egypt, 200 fragments of a papyrus of Bacchylides. Pieced together they formed 1070 lines. Thus 6 poems were recovered practically entire, 8 others with lacunas, and 6 in considerable fragments. Fourteen are *epinikia*, of which 2 in honor of Hiero and 1 in honor of Pythias of Ægina, duplicate odes of Pindar for the same occasions. The remaining 6 are the unique extant specimens of one department of Greek lyric poetry—pæans, dithyrambs, and hymns. One poem (XVII.) is the first recovered literary treatment of a subject common on vases—the descent of Theseus to the depths of the sea to prove his sonship to Poseidon. Not so powerful, brilliant, or original as Pindar, he is a true and typical Greek poet in his smoothness, grace, and finish. His language has less of the Æolic admixture on the foundation of Doric than is the case with Pindar. The MS., in fine uncials, belongs to the First Century B.C., and the accents and breathings are generally carefully marked. The text was first edited by Kenyon (London, 1897), with an introduction and extensive notes. Another is by Blass (Leipzig, 1898). Consult: Wilamowitz-Moellendorf, *Bakchylides* (Berlin, 1898), and Jebb, *Bacchylides* (London, 1898).

BACCIO D'AGNOLO, bä′chō dȧ-nyō′lṓ. See Baglioni.

BACCIO DELLA PORTA, dĕl′lȧ pôr′tȧ. See Bartolommeo, Fra.

BACH, bäɢ. The name of a family originating in Wechmar, near Gotha, Thuringia, famous in music and presenting the most remarkable instance of hereditary genius in all history. In seven generations, there are found to be 49 musicians, 20 of whom, from Veit Bach (died 1619) down to Wilhelm Friedrich Ernst Bach (died, Berlin, 1845), have been more or less prominent musically, and one of them, Johann Sebastian Bach, is one of the great masters of music and the greatest of the Contrapuntal School. Veit Bach was a baker by trade, but devoted much of his spare time to zither-playing. The best-known of the early Bachs was Johann Christoph, son of Heinrich and a great-grandson of Veit. This Johann Christoph (1642-1703) was one of the important composers and organists of the Seventeenth Century, far surpassing his German contemporaries. None of his works were published, and many are lost; but his choral compositions (MSS. in the Berlin Royal Library) prove him the forerunner of Johann Sebastian and Handel.

BACH, Alexander, Baron (1813-93). An Austrian statesman. He was born at Loosdorf, in Lower Austria, where his father held a judicial office. At the age of 24 he was made a doctor of laws, and then entered the Imperial service, where he remained for nine years. Although he favored a departure from the absolute system of Metternich, Bach was not prepared to go so far as the Revolutionists of 1848 wished. Popular opposition, in fact, drove him into the conservative ranks. In 1848, and again from 1849 to 1859, he was in the ministry, at first in the department of justice, and later in that of the interior. He stood for a strong and absolute central government, and opposed all measures that savored of liberalism and concession to other nationalities than the German. He however carried out some salutary measures, such as the emancipation of the peasants from their feudal obligations. From 1859 to 1867 he was ambassador at Rome. Consult Springer, *Geschichte Oesterreichs seit dem Wiener Frieden* (Leipzig, 1863-65).

BACH, Johann Sebastian (1685-1750). The greatest master of the Contrapuntal School of musical composition and the founder of German music. He was born at Eisenach, March 31 (Old Style 21), 1685. He came of a Thuringian family, which presented a remarkable example of the principle of heredity. (See Bach.) Bach's father, Johann Ambrosius, was a violin-player in the town-band of Eisenach. His mother was Elizabeth Lämmerhirt, daughter of a furrier of Erfurt, where Johann Ambrosius had held a position previous to that at Eisenach. The boy was his father's pupil in violin-playing until he was nearly 10 years old. After his father's death, in January, 1695 (two months after contracting a second marriage), he went to live with his elder brother, Johann Christoph, a pupil of Pachelbel and organist in the little town of Ohrdruf.

The Bachs held annual family and musical reunions. According to a description given by Bach's son, Karl Philipp Emanuel, to J. N. Forkel, one of Bach's biographers, these meetings opened with a chorale, which was followed by secular songs, until, at a convenient pause, some one of those present started a catch, in which each joined in proper turn with some humorous phrase, as likely as not hitting at a harmless family or individual failing; thus making a merry ending to the musical exercises of the reunion. The Bachs were a clan of working musicians; and quite as much as the violin lessons received from his father, the musical atmosphere of the Bach household and family traditions must have made their impression on Johann Sebastian. It was the homely life of people in humble circumstances, but it was permeated with music. To think in music was, from childhood, spontaneous—second nature with him. This, together with the scrupulous revision to which in his later years he subjected his earlier works, accounts for the sustained excellence of his vast production.

The Bach clan being so united, it is surprising that Bach's brother at Ohrdruf was moved more to jealousy than admiration by Sebastian's rapid progress. Johann Christoph taught him the clavichord, but kept from him a book containing works by Froberger, Buxtehude, Pachelbel, and others, which the boy coveted. Not to be thwarted, however, he copied the book stealthily and laboriously on moonlit nights, only to be deprived of his copy when it was discovered. The anecdote is wholly in keeping with Bach's devotion to his art. At school, besides his general education, he was trained with the other boys for the church choir, and moreover sang at weddings and funerals. In April, 1700, Bach went to Lüneburg, where he was accepted at the school of Saint Michæl's for the choir of the church. His general education continued at the school; he took his commons at the refectory, and received musical training of much value for his future work, including high services with orchestra, choral singing, organ, and experience with a wider range of music. His fine treble voice, together with his knowledge of violin and clavichord, secured him immediate admittance to the advance matin choir. There was keen musical rivalry between the schools of Saint Michæl's and Saint John's; and when in winter the choirs went through the town streets to sing, separate routes had to be marked out for each, to avoid quarrelsome meetings. As the organ became in time Bach's instrument *par excellence*, and as he is regarded as its greatest master in composition and as one of its greatest masters in playing, it is interesting to note that his serious study of it began in Lüneburg under George Boehm, a pupil of Reinken and a composer of distinction, who was organist at Saint John's Church; which shows that while the musical rivalry between Saint Michæl's and Saint John's was keen, it was also generous. The seriousness with which Bach went about the study of the organ is attested by the fact that he made several journeys to Hamburg to hear Reinken play and profit by his suggestions. Nearly twenty years later, when shortly before Reinken's death, Bach played in Saint Katherine's Church, Hamburg, an improvised elaboration of the chorale *By the Waters of Babylon*, the 'father of North German organists' exclaimed: "I thought this art was dead, but now I see it lives on in you!"

Bach's eagerness to leave nothing undone that would aid his progress in his art was again shown a few years later, when he walked 150 miles from Arnstadt to Lübeck for a brief course of study with the famous organist Buxtehude. Bach had left Lüneburg in 1703, and for a few months was a member of the band of Prince Johann Ernest at Weimar. Chancing to visit Arnstadt, where his granduncle, Heinrich, had been organist, and where an organ lately had been installed in a new church, he played on the instrument. Although the trial is not believed to have been official, he was, at 18 years of age (August, 1703), engaged for a position similar to that which his granduncle had filled with honor. Bach went to Lübeck in 1705, and remained with Buxtehude three months, deliberately extending his month's leave from his Arnstadt duties for this purpose. Whatever the personal consequences might be, he was determined to derive the greatest possible artistic profit from his contact with the justly famous organist. The result was a great advance in organ technique, especially in new insight into the resources and use of the pedal, in which Buxtehude was a master. Naturally, the authorities were displeased at this unceremonious extension of his leave from one month to three; although, with characteristically Bachian honesty of purpose, he pleaded as an excuse his desire "to perfect himself in certain matters touching his art." Further, however, he was rebuked "for that he hath heretofore made sundry perplexing variations and imported various strange harmonies, in such wise that the congregation was thereby confounded." He had returned to Arnstadt in February, 1706. In June, 1707, he accepted the position of organist of Saint Blasius's Church, at Mühlhausen with the same salary as at Arnstadt, and 'the accustomed dues of corn, wood and fish.' In October he married his cousin, Maria Barbara, whose father, John Michæl Bach, had been organist at Gehren. June, 1708, he resigned from Mühlhausen to become organist in the Ducal Chapel at Weimar. Conditions at Weimar were such as to quicken Bach's already active musical faculties. The life of the court was decorous, influenced by Duke William Ernest, a man of serious temperament, a patron of arts and letters and wisely active in bringing the music of the Ducal Chapel up to a high standard. He in fact laid the foundation of that culture which made Weimar the centre of German letters in Goethe's time, and gave it a 'golden period' of music when Liszt resided there. In addition to his duties in the chapel, Bach played the violin or accompanied on the harpsichord in the Court Orchestra, wearing a Hungarian uniform, in which it is difficult at the present day to realize the appearance of the great master of the Contrapuntal School, whose perruqued portrait has come down to us. Bach's growing fame as an organist brought him many invitations to try or inspect organs and to play at various courts. For playing a pedal solo on the organ at Cassel with an agility "which few could equal with their hands" he received from the Hereditary Prince a precious ring which the Prince drew from his own finger.

Bach remained at Weimar nine years. In 1717 he accepted from Prince Leopold of Anhalt-Köthen the office of kapellmeister at Köthen. The Prince, who sang bass and played violin, viola de gamba, and clavichord, warmly welcomed Bach into musical fellowship and made him his companion on various trips. It was the kapellmeister's duty to compose for the instruments on which the Prince played. Accordingly, as Bach's Weimar period is distinguished for his organ compositions, including several of his greatest works for that instrument; so that to his Köthen period belong much of his chamber music and works for clavichord and for orchestra. In a general way, it may be characterized as a lighter period in his life—a temporary relaxation in his self-imposed, severe course of artistic development before entering, in 1723, on the final and greatest epoch of his career as cantor of the School of Saint Thomas at Leipzig, when he achieved the logical results of a genius trained during thirty-two years of rigid preparation; a prelude which alone would have been a sure foundation for his fame, had he not, later, accomplished so much more in larger musical forms. It was during the Köthen period that Bach's first wife died. Of the 20 children born in his two marriages, the two who achieved greatest fame as musicians, Wilhelm Friedemann and Karl Philipp Emanuel, were of the first. His second wife, Anna Magdelena Wülken, whom he married in December, 1721, was a singer at the Köthen Court, and proved herself, both in his domestic and musical life, a helpmeet in the truest sense of the word. Bach's first marriage is known to have been happy, but artistic unions as mutually helpful and felicitous as his second are among the rarities of history.

The post of cantor (or choirmaster) of the School of Saint Thomas in Leipzig was made, through Bach's incumbency of it, one of the most famous in music. The school, which was five centuries old when, in 1723, Bach entered upon his duties, included a choir and a grammar school; and the cantor was supposed to teach in both. Bach, however, assumed the latter duties only when the substitute whom he was allowed to engage was unable to act. Besides teaching the pupils vocal and instrumental music, the cantor had supervision not only of the music in the churches of Saint Thomas and Saint Nicholas, and in less degree in those of Saint Matthew, Saint Peter, and Saint John, but also of the organists and other musicians of the municipality. He was, in fact, Musical Director of Leipzig. But the actual dignity was not so great as this enumeration of his duties would imply. During nearly his whole incumbency of the post, this past-master of his art was harassed by the Town Council, to which he was responsible, and which sought to undermine his authority.

The result was that Bach found his usefulness as a teacher continually hampered. The Council even went so far as to accuse him of being slack; and this shortly after he had produced one of his greatest works, *The Passion According to Saint Matthew*. On another occasion, when he had nine vacancies to fill among the choristers of his school, from which he supplied the various choirs under his supervision, the Council rejected four of those whom he had examined and nominated, and appointed others whom he had rejected. He was assigned a residence in the left wing of the Thomas building, and received also the sum of 700 thalers annually. But the Council claimed that he was so unproficient an instructor in music that he must take part in the teaching of the school; and though he avoided this, the Council suspended some of the perquisites of his post. Those who are unfamiliar with Bach's life, or who form an opinion of the Leipzig cantorship from the fame that has come to it through Bach, are apt to imagine that for thirty-seven years he occupied an exalted and congenial position, active as teacher and composer. In point of fact, neither Council nor city appreciated the genius they had within their walls, and not only wholly failed to honor Bach, but even thwarted him in his work. The position of this great man, who was so wholly devoted to his art that the attitude of the Council simply seemed to him 'wonderful,' and puzzled while it irritated him, was, if not downright pitiable, at least deserving of deep sympathy.

There was a brief respite for him of four years during which Johann Matthias Gesner, who seems to have appreciated the genius of the cantor, was rector of the school. In 1729 Bach was made conductor of the Musical Society—a position which he held until 1736, and his connection with which doubtless accounts for the composition of his secular cantatas. In one of these, *The Contest of Phœbus and Pan*, he took occasion to change the wording of the libretto so as to convey covert satirical allusions to the hostile rector who had succeeded Gesner, and to one Scheibe, a mediocre musician, whose application for a position as organist Bach had rejected, and who, in consequence, showed his ill will in every way possible. When the quarrels which so harassed Bach are analyzed, it appears that the School of Saint Thomas suffered from the double government of rector and cantor, the one in matters of general education, the other in music; and that in asserting what he deemed his prerogatives, the rector probably went to work more practically than the musician whom his art so deeply engrossed. Moreover, Ernesti, who succeeded Gesner, was a son of the Ernesti who was rector at the time Bach became cantor, so that in a measure he had inherited the quarrel. How little influence Bach had in the musical life of Leipzig is shown by the fact that while the Society of Musical Sciences made Handel an honorary member, Bach was admitted only as an ordinary member, and even that not until he had sent in a trial canon. Nor when, in 1743, the concerts from which developed the famous Gewandhaus concerts were inaugurated, was his advice sought. Yet to this master, whose qualifications as a teacher the Town Council of Leipzig impugned, pupils flocked from outside, and no musician of the day thought of passing through the town without paying his respects to the cantor. Besides his most eminent pupils, his two eldest sons, the list included men like Krebs, Agricola, and Kirnberger, and Altnikol, who became his teacher's son-in-law. His activity as teacher and composer, and, above all, the happiness of his home life, must have offered Bach the needed respite from his worries with the authorities. His wife helped him copy his music. As his pupil she became an apt player on the clavichord; both she and his eldest daughter sang, and there were the sons and pupils from among whom to make up an orchestra in his own household. Bach possessed at his death five instruments of the clavichord family, and many stringed instruments. It is likely that his two concertos for three pianos were written for himself to play with his two eldest sons; several of his church cantatas doubtless were written for his wife and daughter, and there can be no question that the opportunity for music in his congenial household greatly stimulated his faculties for composition. Thus at least part of that famous work, *The Well-tempered Clavichord*, had its origin in Bach's desire to give his sons a thorough course of instruction; and the so-called *French Suites* are among the pieces he wrote for his wife while he was teaching her the clavichord. It was Emanuel who, after becoming a kapellmeister in Berlin, brought about, in 1747, the famous meeting between Bach and Frederick the Great. As soon as the King heard of the composer's arrival, he exclaimed, "Gentlemen, old Bach is here!" and Bach, in his traveling clothes, was immediately summoned into his Majesty's presence. The King had 15 pianofortes in different rooms, and on these Bach improvised and developed in various ways a theme proposed by the King. The composer, who was treated with great distinction, wrote as a souvenir of his visit his *Musical Offering*, a series of compositions on the King's theme. Bach's labors were unremitting almost up to his death. His *Art of Fugue*, begun probably in 1749, was barely finished when he set to work at a fugue planned on a colossal scale and introducing as one of the subjects his own name in German notation (B. A. C. H., corresponding to our B-flat, A, C, and B). An affliction of his eyesight which soon resulted in total blindness, stopped the work. Ten days before he died, his eyesight suddenly was restored for a short time. His blindness returning, he called his son-in-law Altnikol to him and dictated music for the chorale, *When We Are in the Depths of Need.* Later, feeling the hand of Death upon him, he had Altnikol change the inscription to *Herewith I Come Before Thy Throne.* He died Tuesday, July 28, 1750. The only public notice of the event was a brief minute of the fact entered by the Town Council. His widow was allowed to die a pauper; and when Saint John's churchyard, where he was buried, became part of a road, his bones were exhumed and scattered.

Bach is the fountain-head of German music. It is due to him that German music is polyphonic; that its ideals have been lofty; that its masters have shown an intellectual grasp of their art which has given a certain sameness to their method of expressing their emotions: and that they have aimed at the sublime and profound rather than at the superficially, though immediately, effective. In all the qualities which go to make up a serious, self-sacrificing, and deeply conscientious devotion of genius to art for art's sake, Bach set an example which has been as a guiding star to his successors. No man was better qualified than the Leipzig cantor to lay broad and deep the foundations of a great school. To him German music owes the richness of harmony, the skillful leading of parts, which, without interfering with melodic beauty, are among its characteristics. Gathering up all the threads of the Contrapuntal School, developing all its forms until he obtained complete mastery of them and carried them to a point beyond which they could not be advanced farther, Bach forms in himself the sum and substance, the very climax, of his school and epoch. The great masters who came after him inherited the technique of his school complete, and applying it to new forms brought their own schools to perfection. Wagner has voiced his admiration for Bach. Even Chopin, the most romantic of composers, was a close student of Bach. Brahms's knowledge of Bach is too obvious to need more than mention; so that Bach's influence is seen to extend to the composer whose music constitutes the very latest inspired utterance in established musical forms. Nor have the great masters of German music, besides Wagner, been slow in expressing their admiration of the *Altmeister.* Mozart gave utterance to his high opinion of Bach's music; Beethoven eagerly embraced the opportunity to subscribe to a fund for the support of one of Bach's daughters. The movement which led to a more general public appreciation of Bach was started by Mendelssohn with a performance of the *Saint Matthew Passion* in Berlin in 1829; and Schumann was prominent in founding the Bach Gesellschaft for the collection and publication of the master's works. The erection of the Bach Monument in Leipzig in 1842 was due largely to Mendelssohn's efforts.

Bach is regarded by organists as the greatest composer for their instrument. In the Lutheran Church, while the congregation sustained the melody of a chorale, the organist was supposed to vary the harmonies. Bach's skill at this was prodigious. He collected no less than 240 chorales for use in his household; 138 have come down to us in print, besides those found in his church cantatas and other large works. His fame as an organ composer rests chiefly, however, upon his preludes, toccatas, fantasias, and fugues. Among these organ compositions should be mentioned the *Fantasia and Fugue in G minor* ('Giant'), probably played by Bach in 1720 in Hamburg in Reinken's presence; the *D minor Toccata and Fugue* (Doris); the *E minor Fugue* which is built upon chromatic intervals; and the *E Flat* or *Saint Ann Fugue;* besides the *Passacaglia in C minor.* No less an authority than Guilman has expressed the opinion that there has been no progress in organ composition since Bach, because Bach's achievements in that branch are the highest possible, and as modern to-day, both in the technical equipment they demand of the player and in the effect they produce, as when they were composed. Bach's most generally known works probably are the *D minor Toccata and Fugue*, arranged by Tausig; the *Chromatic Fantasia and Fugue* (D minor) for pianoforte, and the *Well-tempered Clavichord* (*Wohltemperirtes Clavier*); the two former because they are found in the repertory of every great pianist, the last (48 preludes and fugues through all the major and minor keys), because some acquaintance with it is considered indispensable to a pianist's education. Beethoven mastered it at the age of 11. This famous work, composed partly in 1722, partly about 1740, did not see publication until 1799, nearly 50 years after Bach's death, when it was brought out in London. *Art of Fugue*, begun the year before Bach's death, consists of 15 fugues and 4 canons upon a theme in D minor. Besides a fairly long list of other works for pianofortes, including the charming *French Suites* and *English Suites* and the pretty *Inventions*, showing with how light a touch Bach could handle the smaller forms of his school of composition, in composing chamber music and for the orchestra. It is notable that while organ-playing usually ruins the pianoforte touch, Bach appears to have been equally proficient on organ and clavichord.

Bach's greatest fame among musicians rests on the religious works composed during the Leipzig period of his career. It is noteworthy that these were composed for the Protestant Church, the Church of Saint Thomas being Lutheran; and that, in consequence, their majesty is enhanced by an august severity in keeping with the simpler forms of Protestant worship. Bach has been compared with Milton, and not inaptly, except that the composer could unbend, as witness his *Coffee* and *Peasant's* cantatas and his ditty upon his tobacco pipe, *The Edifying Reflections of a Tobacco Smoker*, which he composed as a bit of pleasantry for his wife. Of church cantatas he is understood to have composed nearly 300, a complete cycle for 5 church years. Of these cantatas some 200 are extant. All except about 30 date from the Leipzig period. He greatly developed this form of church music by freer treatment of the instrumental portions, as well as by his mastery of vocal composition. The chorales are especially rich and beautiful. Of the two *Passions* it has been well said that the *Saint John Passion* is the perfection of church music; the *Saint Matthew* 'reaches the goal of all sacred art' (Poole). The latter, composed in 1729, so much overshadows the former that it is always meant when 'Bach's Passion Music' is spoken of; and it is a question whether the majority of musicians consider this *Passion* (composed at intervals during 1733-38) or the *B minor Mass* the greatest of Bach's works. Bach also composed an *Ascension Oratorio* (usually classed with his cantatas), and *Easter* and a *Christmas Oratorio*, the latter in 6 divisions for performance respectively on Christmas and the two days following, New Year's, the first Sunday of the year, and Epiphany. Mozart, while on a visit to Leipzig in 1789, hearing one of Bach's motets, exclaimed, "Here is a new thing from which I may learn!"

BIBLIOGRAPHY. For the most authoritative biography of Bach, consult Spitta, *Johann Sebastian Bach*, English trans. (London, 1884-85), a monumental work. Consult, also: Forkel, *Ueber J. S. Bachs Leben, Kunst und Kunstwerke* (Leipzig, 1802), which is interesting because the author was a pupil and friend of Bach's sons Friedmann and Emanuel; and Poole, *Bach: His Life and Works* (London, 1882), a good short biography.

BACH, KARL PHILIPP EMANUEL (1714-88). Styled the 'Berlin' or 'Hamburg' Bach. He was the second son of Johann Sebastian, and was born at Weimar. He attended the famous *Thomasschule*, and afterwards the University of Leipzig. In 1740 he went to Berlin, where he was appointed chamber-musician to Frederick the Great. In 1767 he became kapellmeister at Hamburg, where he passed the remainder of his life. His most ambitious composition is the oratorio of *Israel in the Wilderness*. The greater portion of his numerous works was written for his favorite instrument, the clavier (the piano of that day). His essay on *The True Method of Clavier Playing* was long a standard work, and contains invaluable information on the styles of playing prevalent at the time. Clementi professed to have derived from Bach his distinctive style of pianoforte-playing, and Haydn is said to have acknowledged his deep obligation to Bach's works. It was from these works that Haydn learned in embryonic form the cantata and symphony, of which Bach "may fairly claim to have been the originator, though Haydn enriched it and gave it permanence." As a psalm, ode, and song writer, Bach surpassed his contemporaries, and gained great popularity. His idea of the purpose of music he explained by saying: "In my opinion the grand object of music is to touch the heart; and this end can never be obtained by mere noise, drumming, and arpeggios—at all events, not by me."

BACHARACH, bäG'ȧ-raG. A town of the Rhine Province, Prussia, Germany, picturesquely situated on the left bank of the Rhine, at the entrance of the Steeger Valley, 8 miles northwest of Bingen. From the Tenth to the Sixteenth Century, it was one of the most important wine markets in the Rhine Valley. Its commerce and population have greatly diminished, but it is still noteworthy on account of its interesting historical associations and mediæval remains, which include the commanding Castle of Stahleck crowning the hill, the old town walls and towers, the fine ruins of the Thirteenth-Century Gothic Church of Saint Werner, and a timbered hostelry of the Fifteenth Century. Bacharach wine had such high repute that by command, a cask was annually sent to Rome for Æneas Sylvius (Pope Pius II.), and four tuns were accepted yearly by Emperor Wenzel as tribute for the freedom of the town. Through the Steeger Valley, also called the Blucher Valley, Blucher pursued the French troops after crossing the Rhine, on January 1, 1814. Population, in 1900, 1904.

BACHE, bāch, ALEXANDER DALLAS (1806-67). An American physicist. He was born in Philadelphia, and was a grandson of Benjamin Franklin. He graduated at West Point, in 1825, became a lieutenant in the corps of engineers, and remained some time at the Military Academy as instructor. He was employed under Colonel Totten on the fortifications at Newport, where he married Nancy Clarke Fowler. Bache was appointed professor of natural philosophy and chemistry in the University of Pennsylvania, in 1828, and was an early member of the Franklin Institute, publishing many valuable scientific papers in its journals. He established the first magnetic observatory in the United States, where the periods of the daily variations of the magnetic needle were fully determined, and other interesting observations made. A magnetic survey of Pennsylvania, made by Professor Bache, marks the beginning of the magnetic work since carried on by the United States Coast and Geodetic Survey. In 1836 he became president of the trustees of Girard College, and visited Europe to examine educational systems for the information of the board, who were about to organize that institution. His report, submitted in 1838, was of great value in suggesting improvements in educational methods. Before the college was organized, Bache became connected with the public-school system of Philadelphia, and developed the system of free education in that city. At the same time he was actively engaged in scientific work, particularly in the examination of meteorological and magnetic phenomena. In 1842 he returned to his professorship in the university, and in 1843 was appointed superintendent of the United States Coast Survey, succeeding F. R. Hassler, the first incumbent of that position. He reorganized and extended the work of the survey and laid the foundations which have brought the service to its present recognized efficiency.

Professor Bache was also a member of the lighthouse board, superintendent of weights and measures, an incorporator and regent of the Smithsonian Institution, vice-president of the United States Sanitary Commission, president of the American Philosophical Society, president of the American Association for the Advancement of Science, a founder and member of the National Academy of Sciences, and associate of many important scientific institutions at home and abroad. He was the recipient of many honors, including the degree of LL.D. from several colleges, and medals from foreign governments and learned bodies. He gave $42,000 to the National Academy of Sciences for the promotion of its work in furthering scientific research. His important works are: *Observations at the Magnetic and Meteorological Observatory of Girard College*, reports on weights and measures, and various essays in the scientific journals and the proceedings of learned societies. Consult: Henry, "Memoir of Alexander Dallas Bache," Vol. I., *Biographical Memoirs National Academy of Sciences*, reprinted in *Smithsonian Report for 1870*.

BACHE, Benjamin Franklin (1801-81). An American surgeon, great-grandson of Benjamin Franklin. He established at New York a laboratory which supplied the medical department of the Navy, and rendered important service to the Union armies during the Civil War, by running the laboratory at his own expense.

BACHE, Franklin (1792-1864). An American physician and chemist, born at Philadelphia, Pa. He graduated, in 1810, at the University of Pennsylvania; in 1814, at the medical department of the same university. In the latter year he was appointed a surgeon in the United States Army. From 1814 until his death, he was professor of chemistry at the Jefferson Medical College, and in 1854-55 was president of the American Philosophical Society. He published a *System of Chemistry* (1819); *Introductory Lectures on Chemistry* (1841-52), and other works; and, with G. Wood, prepared a *Pharmacopœia* (1830), which was the basis of the present-day *United States Pharmacopœia* and *United States Dispensatory*.

BACHE, Hartman (1797-1872). An American engineer, born in Philadelphia. He graduated at the United States Military Academy, and was appointed colonel of engineers in 1863. In 1865 he was brevetted brigadier-general. He was long employed in topographical surveying, and among his engineering works numbered the Delaware Breakwater and the Brandywine Lighthouse. He retired from active service in 1867.

BACHE, Sarah (1744-1808). The only daughter of Benjamin Franklin. During the Revolution she was active in collecting clothing and money for the Patriot Army, and at one time employed more than 2000 women and girls in making garments for soldiers. She also served in the hospitals, and was widely known for patriotism and benevolence. She married Richard Bache, Franklin's successor as postmaster-general.

BACHE, Walter (1842-88). An English pianist of considerable note. He was born in Birmingham, studied under Moscheles, Richter, and others at Leipzig, and for three years under Liszt, at Rome. He was appointed piano instructor at the Royal Academy of Music, where he founded a Liszt scholarship. In his numerous concerts he was chiefly an interpreter of the music of Liszt.

BACHELET, bȧsh'lā', Jean Louis Théodore (1820-79). A French historian, born at Pissy-Pôville, Seine-Inférieure. He was educated at the Ecole Normale, and was professor of history at various institutions, including the Lyceum of Rouen, of which city he was appointed librarian. His publications are numerous, among the most important being *La guerre de cent ans* (1852); *Cours d'histoire* (3 vols., 1868-75); and, with C. Dezobry, the *Dictionnaire général de biographie et d'histoire* (10th ed., 1889); and the *Dictionnaire général des lettres, des beaux-arts, des sciences morales et politiques* (4th ed., 1875).

BACHELIER, bȧsh'lyā', Nicolas. A French sculptor and architect of the Sixteenth Century. He was born at Toulouse and studied under Michelangelo at Rome. He built a church and a palace at Assier, the main entrance of the Church of Saint Sernin at Toulouse, and other important works. He was among the first to introduce the Renaissance style into France.

BACH'ELLER, Irving (1859—). An American author, born at Pierpont, Saint Lawrence County, N. Y. He graduated in 1882 at Saint Lawrence University (Canton, N. Y.); in 1882-83 was connected with the *Daily Hotel Reporter*, of New York City, and in 1884 was a member of the staff of the Brooklyn *Times*. From 1884 to 1898 he was director of the Bacheller Syndicate for supplying literary material to periodicals, and, during a portion of that time, was also editor of *The Pocket Magazine*. Subsequently he was, for a time, on the staff of the New York *World*. Prior to 1900 he had contributed to magazines and the newspaper press poems and sketches, and had published two books, *The Master of Silence* (1890) and *The Still House of O'Darrow* (1894). In 1900, his *Eben Holden* achieved a great popular success, repeated in 1901 with *D'ri and I* (originally a serial in the *Century Magazine*). Each of these, the former primarily a character study, the latter a martial romance, finds its setting in northern New York.

BACHELOR, băch'ē-lēr (OF. *bacheler*, Fr. *bachelier*, It. *baccelliere*, *baccelliero*, Portug. *baccilar*, all from Med. Lat. *baccalaris*, *baccalarius*, a holder of a small farm or estate called in Low Lat. *baccalaria*. The latter was probably derived from Low Lat. *bacca* for Lat. *vacca*, cow, and thus meant 'grazing land'). The meanings which the word has borne at different times are five. The term was applied to (1) tenants of certain portions of Church lands, called *baccalaria*, a fee of an inferior kind; (2) monks who had not yet taken the full vows of monasticism; (3) persons in the probationary stage of knighthood—not esquires simply, but knights who, for lack of means or from nonage, had not yet raised their banner in the field (*levé bannière*): (4) students who had completed the first grade of their university career; (5) unmarried men who, because of their solitary condition, were regarded as candidates or probationers for marriage. It is the last meaning that the term bachelor, at present, most often bears. Regarded as a class in the community, bachelors have formed the subject of legislation from the earliest times. Upon the principle that every citizen is bound to rear up legitimate children to the State, penalties have often been imposed upon male celibates in various countries. In proportion as the interests of the State were regarded above those of the individual, the enforcement of marriage was more severe. In ancient Sparta, it was considered a punishable crime not to marry, or to marry too late in life; and at Athens celibacy, though not severely punished, was discouraged in early times. At Rome marriage was fostered by positive penalties imposed on unmarried men, and sometimes even on women, as well as by discrimination in favor of heads of families. In the allotment of the Campanian lands by Julius Cæsar, portions were granted only to the fathers of three or more children. Under Augustus, a law was enacted prohibiting unmarried persons below the age of 60 in men, and 50 in women, from taking possession of a legacy; and this was applied even to widows, who, in order to secure their part of the deceased husband's estate, were forced to marry again within a period of two years. There are numerous instances in Great Britain of special taxes being imposed upon bachelors and widows, with a view, however, more to the increase of revenue, than for any other object. In France, where the problem of depopulation has been of such serious moment as to threaten the very position of the State among the great Powers of Europe, frequent attempts have been made to impose taxes upon bachelors, but with very little success. See BACHELOR'S DEGREE.

BACHELOR. See CRAPPIE.

BACHELOR, KNIGHT (Fr. *bas chevalier*). The lowest grade of knighthood, now only bestowed in the United Kingdom. It has frequently been conferred for no weightier service than carrying a congratulatory address to court. See KNIGHT.

BACHELOR OF SAL'AMAN'CA, THE. A novel by Le Sage, published in 1736. Le Sage pretended that it was drawn from an old Spanish MS., but its inspiration need be traced no further back than the ingenious brain of the author of *Gil Blas*. It was his last work.

BACHELORS' BUTTONS. A name commonly applied to certain varieties of the buttercup.

BACHELOR'S DEGREE'. One of the oldest of academic distinctions, the exact significance of which has varied in different countries and in different periods in the same countries. In general, it has been conferred at the close of the first stage in a liberal education, and is supposed to indicate that the recipient is proficient in certain fundamental branches. The original form of the degree was Bachelor of Arts (B.A.), and usually it is essential that this degree should be taken before proceeding to the higher degree of Master of Arts, or Doctor of Philosophy. In France there are two forms for the baccalaureate degree—*bachelier ès lettres* and *bachelier ès sciences*. Great Britain, while conservative about the B.A. degree, recognizes also B.Sc., and the bachelor's degree is also conferred in professional courses. So, too, in the United States, there are Bachelors of Law (LL.B. or B.L.), Bachelors of Divinity (B.D. or S.T.B.), Bachelors of Medicine (M.B.), etc. Here, too, where academic degrees are but slightly protected by law, many modifications of the baccalaureate degree have been employed to indicate the completion of certain special courses of study. The scientific schools have given the degree of Bachelor of Philosophy (as at Yale, since 1852), Bachelor of Science (as at Harvard, since 1851), and in many places the degree of Bachelor of Letters is conferred upon those whose studies are not scientific or classical, but are based on modern literature. Bachelor of Science (B.S.) is in almost every college and university an established degree, while Bachelor of Philosophy (Ph.B.) and Bachelor of Letters (B.L. or Litt.B.) have in the majority of cases been introduced only to be discarded. The bachelor's degree has also been given in pharmacy, agriculture, music, veterinary medicine, and many other subjects; but there is much opposition to this use of the traditional 'baccalaureate,' and the tendency is more and more toward its limitation.

BACHERACHT, bä'ke-räkt, THERESE VON. See LÜTZOW, THERESE VON.

BACHET, bá'shâ', CLAUDE-GASPAR, Sieur de Méziriac (1581-1638). A French mathematician and philologist. He was born in Paris, and is said to have belonged in his youth to the Order of the Jesuits. At the age of 20 he was teaching rhetoric in the College of Milan, but soon afterwards settled in Paris, where he became a member of the French Academy from the time of its foundation (1635). He published some literary works, among which is *Epîtres d'Ovide en vers français, avec des commentaires fort curieux* (Bourg-en-Bresse, 1626; reprinted at The Hague, 1716, with other of his works). In mathematics he was the first in Europe systematically to undertake the solution of indeterminate linear equations, and his commentaries were a point of departure for the work of Fermat in his theory of numbers. Bachet published *Les problèmes plaisants et délectables qui se font par les nombres* (Lyons, 1612; ed. 5, Paris, 1884); *Diophanti Alexandrini Arithmeticorum Libri Sex et de Numeris Rectangulis Liber Unus* (Paris, 1621-70). He also left a manuscript, entitled *Elementorum Arithmeticorum Libri XIII.* (*Bibliothèque de l'Institut*), extracts of which were published in the *Bollettino Boncompagni* (1879).

BACHMAN, băk'măn, JOHN (1790-1874). An American naturalist and clergyman. From 1815 until his death he was pastor of a Lutheran church in Charleston, S. C. He was assistant to Audubon (q.v.), and chief author of the work on North American quadrupeds. Among his own works are: *A Defense of Luther and the Reformation* (1853), and *Characteristics of Species and Genera as Applicable to the Doctrine of the Unity of the Human Race* (1854).

BACHMUT, bȧg-mōōt'. See BAKHMUT.

BACHO, bā'kō. See BACONTHORPE, JOHN.

BÄCHTOLD, bĕᴋ′tōlt, Jakob (1848-97). A German literary historian, born at Schleitheim. He studied at Heidelberg, Munich, Tübingen, Paris, and London, and in 1872 was an instructor in the gymnasium at Solothurn. In 1888 he became professor of the history of German literature at Zürich. His principal work is *Geschichte der deutschen Litteratur in der Schweiz* (1888-92), and his other important publications include *Deutsche Handschriften aus dem Britischen Museum* (1873) and *Gottfried Kellers Leben* (1894-97). He also published a critical edition of Goethe's *Götz von Berlichingen* (1882 and 1888); *Iphigenia* (1883 and 1887); *Dichtung und Wahrheit* (1890-91). He was associate editor, with Vetter, of the *Bibliothek älterer Schriftwerke der deutschen Schweiz*. After his death Vetter published *Kleine Schriften von Jakob Bächtold* (1899).

BACHUONE, bȧ-chwō′nȧ, Arnoldo. See Villanovanus, Arnoldus.

BACIL′LUS. See Bacteria; Cholera; Colon Bacillus; and Tuberculosis.

BACIOCCHI, bȧ-chō′kē, Marie Anne Elisa Bonaparte (1777-1820). The eldest sister of Napoleon Bonaparte. When Corsica was occupied by the English, she, with her family, emigrated to Marseilles, where she married Captain Baciocchi, later created Prince of Lucca and Piombino. The elevation of Napoleon raised her also to rank and power; and in 1806 the principality of Massa and Carrara was intrusted to her administration, which was, on the whole, a beneficial one for the people. In 1809, she was made Grand Duchess of Tuscany. Here the arbitrary measures of her brother, which she had to carry out, and her own self-will and harshness, rendered her unpopular, and when the Allies entered Tuscany in 1814, she was forced to leave Florence.

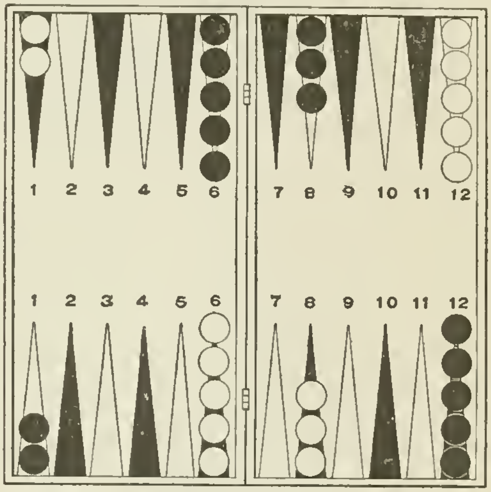
BACK, Sir George (1796-1878). A famous English Arctic explorer. He was born at Stockport, England, in 1796. In 1819 and 1825 he accompanied Franklin in his expeditions to the north coast of America. He volunteered to the Government to go in search of Captain Ross, who was supposed to have been lost in his attempt to discover the Northwest Passage; and on the 28th of June, 1833, he started from Norway House, a station of the Hudson Bay Company. After passing a terrible winter with his companions at Slave Lake, he discovered, in 1834, Artillery Lake, and the Great Fish River, or Back's River, which he followed to the Frozen Ocean. Being hindered by the ice from proceeding along the coast as far as Cape Turn-again, he returned by the river; but although he had received news of the return of Captain Ross, he continued his explorations in the Northern Sea, and did not return to England until 1835, when he was raised to the rank of post-captain for his services. In 1836 and 1837, he further explored the Arctic shores—the Geographical Society, in the latter year, bestowing its gold medal upon him. Two years afterwards he was knighted. He attained flag rank in 1857, and that of admiral in 1867. He was an able artist and descriptive writer, and wrote and illustrated, *Narrative of the Arctic Land Expedition to the Mouth of the Great Fish River* (1833-35) and *Perils and Escapes of H.M.S. Terror* (1836-37).

BACK BAY. A former widening of the Charles River, now filled in, and forming the most exclusive residential district of Boston. In it many of the finest streets, churches, and public buildings of the city are situated.

BACK′BITE, Sir Benjamin. A character in Sheridan's *School for Scandal*. He is an emasculated creature, with a vinegary tongue, deeply versed in all manner of evil-speaking, lying, and slandering. Crabtree, his uncle, Mrs. Candour, and himself are the leading members of the 'school.' He affects to be a poet and wit.

BACKER, băk′ẽr, Jakob (1609-51). A Dutch painter. He was born at Haerlingen, and was a pupil of Lambert Jakobsz at Leewarden, and afterwards of Rembrandt at Amsterdam. He was noted for his portraits and historical pieces, and for the facility and quickness with which he worked. His nephew, Adrian Backer, of Amsterdam (1636-86), was also a successful historical and portrait painter.

BACK′GAM′MON. One of the most ancient and widespread dice games, of which three schools survive—the Russian, Turkish, and English. It is sometimes called, 'tric-trac,' though this is properly a distinct variety of the game, and in England was formerly known as 'the tables.' The word 'backgammon' has been ascribed to the Welsh tongue, in which it is said to signify 'little battle.' Strutt ascribes the term to the Saxon 'bac' and 'game,'—that is, back-game,—so denominated because the performance consists in the two players bringing their men back from their antagonist's table into their own; or because the pieces are sometimes taken up and obliged to go back—that is, reënter at the table they came from.



BACKGAMMON BOARD.

The backgammon board consists of two parts or tables, known as the inner or home table and the outer table. Each table possesses 12 points, 6 at each end. The game is played by two persons, each of whom has 15 'men.' In beginning the game, the 'men' are placed on certain points on the tables, directly opposite each other. The game is played with 2 dice, which are common to both players; but each player uses his own dice-box. The throws are alternate. If a player throws 'doublets,' or both dice of one number, double the number of dots is reckoned; thus, by a throw of 2 aces, the player does not count 2, but 4. Each player counts round from the right-hand or ace-point of the other. The object of the game is for each player to get all his 'men' played round into his own left-hand table, removing them from point to point according to the throws of the dice. In throwing, the number upon each die turned up may be reckoned by itself, or collectively with the number on the other side. Thus, if 4 be thrown by one side, and 6 by the other, one 'man' can be advanced 4 points, and another 6 points; or one man can be advanced 10 points, always providing that a point is open to suit this movement to it. No point can be moved to if covered by 2 'men' belonging to the adversary. If covered by only one 'man,' which is called a 'blot,' then that 'man' can be 'hit'—i.e. removed from the point, and placed on the bar between the tables, its place being taken by the 'man' who has won it. The removal of a 'man' to the bars throws a player considerably behind in the game, because the 'man' must remain out of the play till the dice turn up a number corresponding to an open point on the adversary's table. There are two kinds of victory—winning the 'hit' and winning the 'gammon.' The party who has played all his 'men' round into his own table, and by fortunate throws of the dice has borne or played the 'men' off the points first, wins the 'hit.' The 'gammon' may be explained as follows: When you have got all your 'men' round to your own table, covering every point, and your adversary has a 'man' out, then you are enabled to 'bear' or lift your men away. If you can bear all away, so as to clear your table before the adversary gets his 'man' placed by a throw on your table, you will win the 'gammon.' If the adversary has been able to bear one before you have borne all your 'men,' it reduces the victory to a 'hit.' Two 'hits' are reckoned equal to one 'gammon' in playing matches.

BACKHUYSEN, bäk'hoi-zen, Ludolf (1631-1709). A Dutch marine painter, born at Emden. At the age of 18, he became the pupil of Aldert van Everdingen. His first sketches in India-ink and bistre, made among the shipping, were bought by collectors at good prices. He was a painter of stormy seas, and many times risked his life and those of seamen in the pursuit of studies for his pictures. His coloring does not compare favorably with that of Willem van der Velde; nevertheless, he portrays the spirit of the sea, particularly in its wild and boisterous aspects. Backhuysen seems to have been the popular marine painter of his time. He has left numerous examples of his work, and many of them are of considerable size. One, representing a coast scene of great beauty, dated 1675, is in the Amsterdam Museum. In the Louvre is his "Rough Sea at the Mouth of the Maas." Two of his pictures are in the Museum at The Hague. Many are in England in the National Gallery. Peter the Great was a pupil of Backhuysen, and the painter made for the Czar numerous drawings for the construction of vessels. After he was 71 years old, he began etching on copper. He also made attempts in poetry. He died in Amsterdam. The line of Dutch marine painters is said to have come to an end with the death of Backhuysen. Consult: Buxton, *German, Flemish, and Dutch Painting* (London, 1881); Radcliffe, *Schools and Masters of Painting* (New York, 1898).

BACKLUND, bäk'lund, John Oskar (1846—). A Swedish astronomer, born at Lenghem, Sweden. He has been lecturer at the University of Upsala (1875); assistant at the Stockholm Observatory (1876); observator at the Dorpat Observatory (1876); and adjunct-astronomer at the Observatory of Pulkowa, Russia. One of his principal publications is the treatise entitled *Observations de Pulkowa* (1888).

BACKSTROM, běk'strēm, Per Johan Edvard (1841-46). A Swedish author, born at Stockholm and educated at Upsala. He published several volumes of verse, including *Lyriska Dikter* (1870). His dramas, of which the chief is the tragedy, *Dagvard Frey* (1876), were long popular. He made translations from Ponsard, Victor Hugo, and others.

BACK'US, Isaac (1724-1806). An American clergyman and author. He was born at Norwich, Conn. He left the regular Congregational body for the Separatists, or New Lights, and these sympathized warmly with the Baptists, whose leader he became, and by his own exertions largely increased the prosperity of the denomination. He was a strong advocate of the entire separation of Church and State, and went before the Continental Congress in 1774 to ask for the Baptists the same privileges that were granted to other sects. Among his numerous writings, *A History of New England, with Particular Reference to the Denomination of Christians Called Baptists* (Boston, 1777-96, 3 vols.; reprinted Newton, Mass., 1871, 2 vols.) is the most important.

BACKUS, Truman Jay (1842—). An American educator. He was born at Milan, N. Y., graduated at Rochester University in 1864, and was professor of rhetoric and English literature at Vassar College from 1867 to 1883. In 1883 he was appointed president of Packer Collegiate Institute (Brooklyn, N. Y.). He was one of the incorporators of the Brooklyn Institute of Arts and Sciences.

BACLER D'ALBE, bá'klâr' dälb', Louis Albert Ghislain, Baron (1762-1824). A French painter, soldier, and chartographer. He published a *Carte du théâtre de la guerre en Italie* (54 parts, 1802), and rose to be general of brigade under Napoleon, in all of whose campaigns he served. His most noted paintings, "The Battle of Arcole" and "The Battle of Rivoli," are in the Versailles Gallery. He published *Souvenirs pittoresques contenant la campagne d'Espagne* (1824), a series of lithographic views, and other similar works.

BACOLOD, bä'kō-lōd', or **BACOLOT**, bä'kō-lōt'. The capital of the Province of Western Negros (area, 1929 square miles; population, 226,995) on the island of Negros (q.v.), Philippines. It is situated on the western coast and has a population of 6270 (Map: Philippine Islands, G 9).

BACOLOR, bä'kō-lōr'. The chief town of the Province of Pampanga, on the island of Luzon, Philippines (Map: Luzon, D 7). The province is situated in the middle of the island, near the Bay of Manila, and covers an area of 2209 square miles, with a population in 1901 of 223,922. It is well populated and produces sugar, rice, indigo, and tobacco. It has a number of sugar-mills and carries on a large local trade. The capital, Bacolor, is situated 47 miles northwest of Manila, with which it is connected by a road. It has a telegraph station and is connected by rail with Macabebe, about 6 miles southeast. Population, 10,600.

BA'CON. A town in the Philippines, in the Province of Albay, Luzon. It lies on the Gulf of Albay, about 6 miles east of Albay, the capital. Population, over 13,000 (Map: Philippine Islands, J 6).

BACON, Alice Mitchell (1858—). An American writer and teacher. She was born at New Haven, Conn., the daughter of the Rev. Dr. Leonard Bacon. She taught at Hampton Institute, from 1883 to 1888, and at the Peeresses' School, Tokio, Japan, in 1889, where she wrote *Japanese Girls and Women* (1894; illustrated edition, 1901), which has become a classic, and *A Japanese Interior* (1893). She returned to Hampton Institute in 1890, and founded the Dixie Hospital for the training of colored nurses. In 1900 she began teaching in the Peeresses' School and Girls' High School, Tokio, Japan.

BACON, Benjamin Wisner (1860—). An American theologian. He was born at Litchfield, Conn., and graduated at Yale. He has prepared a translation of Wildeboer's *Kanon des Ouden Verbonds* (*The Genesis of Genesis*) (1891); *Triple Tradition of the Exodus* (1894); and *Introduction to the New Testament.*

BACON, Delia Salter (1811-59). An American author (born at Tallmadge, Ohio), the sister of Leonard Bacon (q.v.). She wrote *Tales of the Puritans* (1857), and other works of fiction, and in 1857 published in London her *Philosophy of the Plays of Shakespeare Unfolded*, with a preface by Nathaniel Hawthorne. In this book she zealously advocated the theory that Francis Bacon wrote the plays of Shakespeare. Though this theory was not original with her, she was the first to give it general currency. Consult: Hawthorne, "Recollections of a Gifted Woman," in *Our Old Home* (Boston, 1863); and Theodore Bacon, *Delia Bacon* (Boston, 1889).

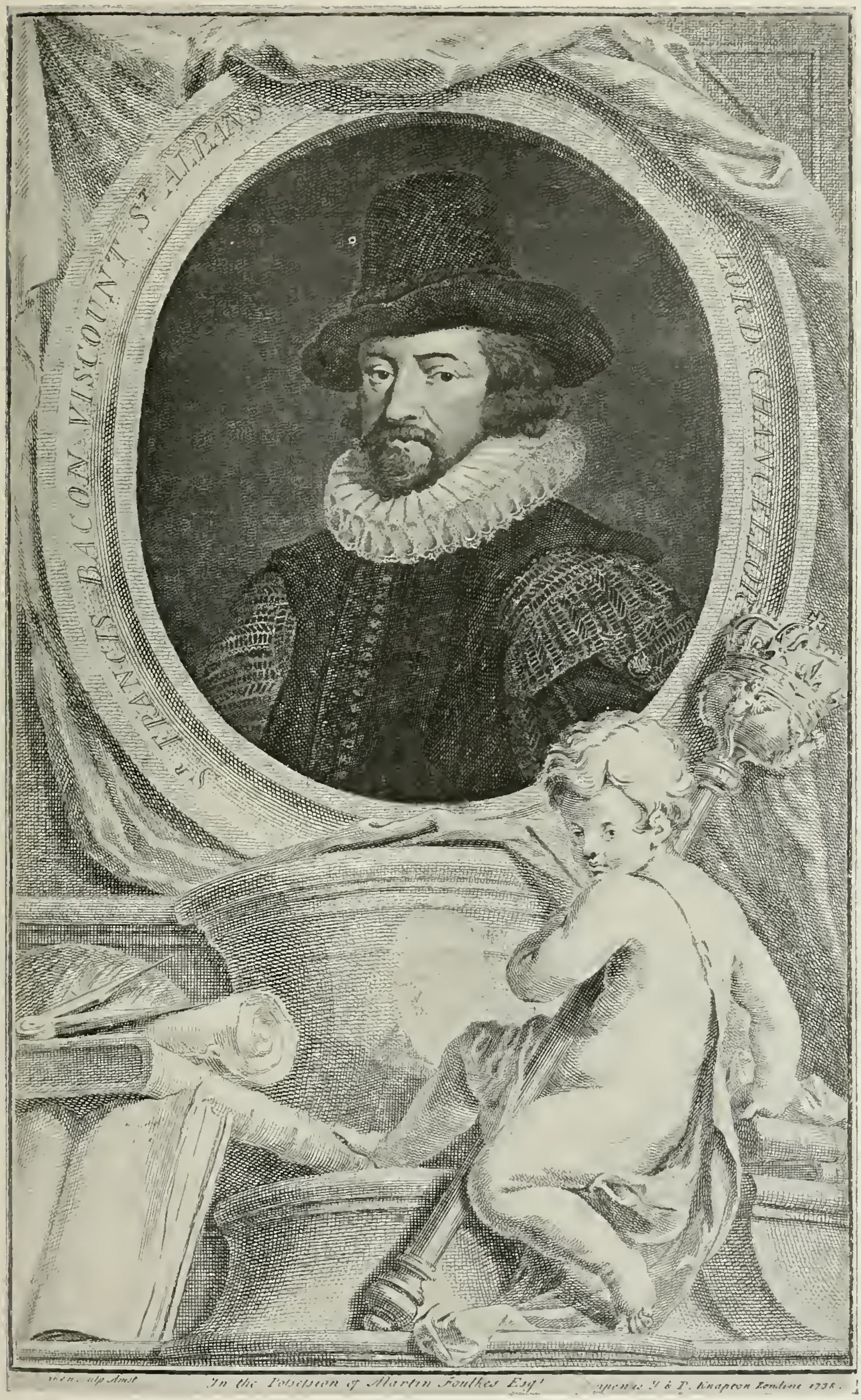
BACON, Francis, Baron Verulam, Viscount Saint Albans (1561-1626). A celebrated English philosopher. He was born in London on January 22, 1561. His father, Sir Nicholas Bacon (q.v.), was Lord Keeper of the Great Seal, and his mother was the learned Ann Cooke, sister of Burghley's wife. In early childhood, Bacon manifested superior powers and an ardent love of knowledge; his precocious intelligence was so great, and his sedateness so remarkable, that Queen Elizabeth took pleasure in calling him her 'young lord keeper.' In his thirteenth year he was sent to the University of Cambridge, which he quitted, after a residence of two years, with a low opinion of the course of study pursued there, and also of the Aristotelian system of philosophy. On leaving the university he went to Paris in 1576, in the suite of Sir Amias Paulet, the English Ambassador, and there he is said to have occupied himself chiefly with statistics and diplomacy. The sudden death of his father in 1579 recalled him to England, where, after failing to procure from the Government a provision which would enable him to devote himself to science and literature, he betook himself for several years to the study of law, and was admitted to the bar in 1582. Two years afterwards he entered Parliament from the borough of Melcombe Regis. In 1584 or 1585 he published a "Letter of Advice to Queen Elizabeth," in which he advocated "that whosoever would not bear arms against all foreign princes, and namely the Pope, that should anyway invade her Majesty's dominions, should be a traitor." In 1586 he became a bencher of Gray's Inn, and in 1589 wrote another letter, this time in defense of Elizabeth's course in Church matters. But neither these letters nor the support of the Earl of Essex, whose favor he had won, could counteract the effect produced on the Queen and the Lords by his opposition in Parliament to some taxation measures in which the Government was interested. A chance was given him to apologize for this act of antagonism, but he resolutely refused, and thereby lost an opportunity to become attorney-general (1594). Another failure to apologize was followed by failure to secure the solicitor-generalship, although he was now supported by both Essex and Burghley. These facts it is well to keep in mind, because they show a strength of character in striking contrast to the glaring sycophancy of his conduct in later years. When Essex found that he could do nothing for his favorite at court, he presented him with a private estate worth about £1800, and also supported him in a suit for the hand of Lady Hatton, whom Bacon wished to marry for her wealth. Lady Hatton, however, preferred Coke, Bacon's future enemy. In spite of his readiness thus to accept the patronage of Essex, when the latter was brought to trial for his conduct in Ireland, Bacon acted as Queen's counsel against his friend. His motives in this matter have been differently interpreted. Some say that, because he was straitened in his circumstances at this time, he was anxious to conciliate the Court. Others maintain, with perhaps more justice, that he took this stand as being the only course open to him for securing the least severe sentence possible for his old friend. Essex himself, however, did not concur in this interpretation of Bacon's conduct. The result of this first trial of Essex was that he was set at liberty; only, however, shortly afterwards to be tried again—this time for conspiracy. Bacon was now, without doubt, largely instrumental in securing for the Crown the verdict against the accused. The merits of the case cannot be discussed here. Bacon asserted that his official position made it necessary that he should ignore ties of friendship; but then perhaps he should not have allowed himself to be put in such a position. Furthermore, the conscientious performance of official duties at the expense of his personal advantage was by no means a conspicuous trait in his character. After the Earl's execution he wrote, at the request of the Queen, *A Declaration of the Practices and Treasons Attempted and Committed by Robert, Earl of Essex*, which was printed by authority, but with so many changes made by another hand that Bacon cannot justly be held responsible for its authorship.

With the advent of the reign of James I., a new opportunity opened to Bacon, and by paying court to the King he made rapid progress. He was knighted in 1603: and in the following year a pension of £60 was attached to his office of learned counsel. In 1606 he succeeded in his ambition to marry a wealthy woman by winning the hand of Alice Barnham. In 1607 he secured the long-coveted solicitor-generalship, and thus came into the possession of what, in money of to-day, would amount to £4000 a year. This appointment Bacon had probably secured by his defense of royal supremacy in a dispute concerning the King's jurisdiction over some border counties. From now on, he volunteered much advice to his sovereign, who, however, refused to be guided by him. Bacon's advice was marked by a strange mixture of great wisdom and unworthy trivialities. He showed wonderful insight into the political situation, and suggested plans which, if carried out, might have averted much of the trouble that ensued. But James was not a king to listen to suggestions conflicting with his inclinations; while Bacon unfortunately did not possess a character that could give weight to his advice. In the coming struggle Bacon became more and more obsequious. He justified himself in his own eyes by the excuse that he was keeping in touch with the King for the good of his country; but it was now obvious to every patriot that no good would come to his country from the wilful King. In 1613 Bacon was appointed attorney-general; and in this new office he soon became entangled in dispute with Coke on constitutional principles, and made himself obnoxious to the people at large by his unscrupulous cupidity. His subservience to the King, however, served him in good stead for a few more years. In 1617 he was appointed to the position his father had held before him, that of Lord Keeper of the Great Seal, and in the year following he attained to the high dignity of the Lord Chancellorship and the title of Baron Verulam. In 1621 he was created Viscount Saint Albans. The enjoyment of his new honors was, however, very brief. The storm which had been gathering against the Government broke first on Bacon's head. On the assembling of Parliament he was charged with bribery. During the trial he himself confessed to the Lords that "there had been a great deal of corruption and neglect," for which he "was heartily and penitently sorry." On the first of May he was deprived of the Seal, and then followed sentence on him, condemning him to pay a fine of £40,000, to be imprisoned during the King's pleasure, and to be excluded from Parliament and from Court. The fine, however, was remitted by the King, and the imprisonment lasted only two days. Sometime afterwards he was even allowed to appear at Court. It seems that he now conceived the hope of reëntering political life; but even in those debauched days this was impossible, and he thenceforth devoted himself to literature and science. The immediate occasion of his death was a cold caught in making an experiment to test the power of snow to preserve flesh. He died in the house of the Earl of Arundel, to which he had been removed with the fatal chill upon him, April 9, 1626.

It may be seen from the preceding sketch that the political life of Bacon was, on the whole, not an achievement of which he could well be proud. His glory is in his literary and scientific work.

The first edition of his *Essays* appeared in 1597; his two books on the *Advancement of Learning* in 1605 (this work was afterwards treated as the first part of the projected *Instauratio Magna*); his *De Sapientia Veterum* (Wisdom of the Ancients), in 1609; a revised edition of the *Essays* in 1612, while the final form was given to them in 1625; the *Novum Organum* (so called with reference to Aristotle's old *Organon*) appeared in Latin, in 1620, and was treated as the second part of the *Instauratio*. The third part of this comprehensively planned work, or at least a section of the third part, appeared in 1622, under the title *Historia Naturalis et Experimentalis ad condendam Philosophiam; sive Phænomena Universi*. Of the other three contemplated parts of the *Instauratio* only two prefaces remain. In 1622 he also published his chief historical work, *History of the Reign of Henry VII*. In 1623 appeared his *De Augmentis Scientiarum*, a Latin translation and extension of his *Advancement of Learning*. His last work, which was published posthumously (1627), was *Sylva Sylvarum*, a book which showed very conclusively that he was not able, in practice, to live up to his scientific theory. The *New Atlantis*, which appeared at the same time with the last-mentioned work, had been written as early as 1617. Besides these, he wrote several minor books and papers, which need not here be named. It is enough to say that his writings embrace almost all subjects, from jurisprudence—which he treated not as a mere lawyer, but as a legislator and philosopher—to morality and medicine. The *Essays* are a treasury of rich knowledge of human relations, and the style in which they are written has seldom been equaled by any English writer.

Bacon's reputation as an original philosopher, as an epoch-maker in philosophic and scientific thought, was higher a generation or two ago than it is now. Yet his *Novum Organum* has done, perhaps, more than any other single work toward inculcating into science the spirit of unbiased, accurate, and careful observation and experimentation. In it he maintains that all prepossessions, called 'idols,' must be abandoned, whether they be the common property of the race due to common modes of thought ('idols of the tribe'), or the peculiar possession of the individual ('idols of the cave'); whether they arise from too great a dependence on language ('idols of the market-place'), or from tradition ('idols of the theatre'). These idols once discarded, the seeker after truth must proceed to interrogate nature, not contenting himself with accepting what she has to say of her own accord. He must collect facts, arrange them in order, and then advance to the discovery of the laws that control their workings. This cannot be accomplished by the Aristotelian *inductio per enumerationem simplicem*, or mere inventory of all possible cases of the phenomena under investigation; but negative instances, i.e. cases in which the phenomena are absent, must be examined to discover wherein these instances differ from the affirmative instances—all this with a view to discover the 'form' of the phenomena, or their abiding essence. This insistence upon the formal cause has its significance only in connection with Bacon's exclusion of final causes or purposes from the domain of natural science. Not that purpose has no existence in the universe. On the contrary, Bacon believed in an overruling Providence with a perverse piety ill


Sr. FRANCIS BACON VISCOUNT St. ALBANS
LORD CHANCELLOR
ken. sculp Amst
In the Possession of Martin Foulkes Esqr.
Impensis J. & P. Knapton Londini 1738.

LORD BACON

FROM AN ENGRAVING BY JACOBUS HOUBRAKEN

in accord with his life. But though religion can imagine the purposes of God, the business of the scientist is to understand the causal sequences of nature as controlled by the essences of phenomena. In ethics Bacon is to be regarded as the forerunner of the English Hedonistic School (see HEDONISM), of which his disciple, Hobbes, is usually regarded as the founder. Bacon's own scientific work amounted to little. It is true that he propounded the theory that heat is a kind of motion, but this suggestion seems rather to have been a happy guess than a belief scientifically grounded. He was an opponent of the Copernican system of astronomy, which he regarded as a strange fancy; and he seems to have known nothing of the work of Kepler or of Harvey. His enthusiasm for science was not disinterested, but was due to a belief that 'knowledge is power'; that human conditions can best be improved by a more thorough acquaintance with the world in which human life must be lived.

Bacon's collected works were first published by Blackbourne, in 1730; another collection, with a life, by Mallet, in 1740; a handsome but ill-arranged edition is that of Montagu in 17 vols. (London, 1825-36); but the best, it is generally admitted, is that edited by Spedding, Ellis, and Heath, in 7 vols. (1857-59), with *Life and Letters*, 7 vols., ed. by Spedding (1861-74). A noted review of Bacon's character and works is to be found among Macaulay's *Essays*. For more temperate estimates consult: Fowler, *Bacon:* "English Philosophers Series" (London, 1881); Church, *Life of Bacon:* "Men of Letters Series" (New York, 1884); Abbott, *Francis Bacon: An Account of his Life and Works* (London, 1885); and John Nichol, *Francis Bacon: His Life and Philosophy* (London, 1888-89).

BACON, JOHN. See BACONTHORPE, JOHN.

BACON, JOHN (1740-99). A British sculptor, born in London. In 1769 he received the first prize from the Royal Academy, of which he was soon after made a member. Among his principal works are: two busts of George III., one in Christ Church College at Oxford, the other in the University Library at Göttingen; and monuments of Lord Chatham in Westminster Abbey and in Guildhall, and of Blackstone at Oxford.

BACON, JOHN EDMUND (1832-97). An American lawyer, born at Edgefield, S. C. He graduated at South Carolina College, in 1851, and soon afterwards was admitted to the bar. In 1858 he was appointed secretary to the United States Legation at Saint Petersburg, but resigned to enter the Confederate Army, in which he rose to the rank of major. He was sent with Gov. James L. Orr to Washington, in 1866 to bring about the restoration of South Carolina to the Union. In 1867 he was elected district judge, but was presently deposed by the Federal departmental commander. He was, in 1886, appointed United States chargé-d'affaires in Uruguay and Paraguay.

BACON, JOHN MACKENZIE (1846-1904). An English clergyman, scientist, and aeronaut. He studied at Trinity College, Cambridge; was ordained priest of the English Church in 1870, and was curate of Houston, Cambridge, in 1870-77. Two eclipse expeditions of the British Astronomical Association—that to Buxar, India, in 1898, and that to Wadesboro, N. C., in 1900—were made under his direction. In 1899 he accomplished the record voyage in English ballooning—ten hours from start to finish. He has published *By Land and Sky* (1901), which contains narratives of his ballooning exploits and the results of many of his investigations in meteorology, acoustics, and other subjects.

BACON, LEONARD (1802-81). An American clergyman and writer. He was born at Detroit, Mich.; graduated at Yale in 1820 and at Andover in 1824. From 1825 till his death, he was pastor of the First Church in New Haven; from 1866 to 1871, acting professor of revealed theology in Yale, and afterwards lecturer on ecclesiastical polity and American Church history. He was one of the editors of the *Christian Spectator*, and later an editor of the *New Englander;* also, for 15 years, one of the editors of the New York *Independent*. Dr. Bacon edited the *Select Practical Writings of Richard Baxter, with a Life of the Author* (2 vols., New Haven, Conn., 1844); and of his other writings may be mentioned, *Thirteen Historical Discourses on the Completion of Two Hundred Years, from the Beginning of the First Church in New Haven, with an Appendix* (New Haven, Conn., 1839); *Slavery Discussed in Occasional Essays from 1833 to 1846* (New York, 1846), and particularly *The Genesis of the New England Churches* (New York, 1874)—an important volume.

BACON, LEONARD WOOLSEY, D.D. (1830—). An American clergyman, born in New Haven, Conn.; a son of Leonard Bacon. He graduated at Yale in 1850, and after officiating as a clergyman in various places was pastor of the First Church in Litchfield, Conn., of the New England Congregational Church in Brooklyn, and of the First Church in Stamford, Conn. Subsequently he passed several years in Europe, chiefly in Geneva, as student, preacher, and writer; was pastor of the Park Congregational Church in Norwich, Conn. (1878-82), and later of other Congregational and Presbyterian churches. He edited *Luther's Deutsche geistliche Lieder* (New York, 1883), and wrote *Irenics and Polemics, with Sundry Essays in Church History* (1895); *History of American Christianity* (New York, 1897; London, 1899); *Young People's Societies* (with C. A. Northrup, 1900), and other religious works.

BACON, NATHANIEL (1648-76). An English colonist, famous as the leader of 'Bacon's Rebellion' in Virginia, in 1676. He was the son of Thomas Bacon of Friston Hall, Suffolk, whose grandfather was cousin to the great Lord Bacon. Nathaniel Bacon was educated as a lawyer, and settled in Virginia in 1673, where he obtained two valuable plantations near the present Richmond, and afterwards was appointed a member of the Governor's Council. His democratic ways made him extremely popular among the colonists, who chose him to lead them against the Indians, in defiance of Governor Berkeley's commands, on the outbreak of the Indian disturbance, in 1675-76. He accepted the position, and by placing himself at the head of the colonists and proceeding against the Susquehannocks brought on what is known as 'Bacon's Rebellion.' In the midst of his operations against the Indians he was attacked by dysentery, and died on October 26, 1676, his death putting an end to the rebellion. See BACON'S REBELLION.

BACON, Sir Nicholas (1509-79). A distinguished English statesman, father of Francis Bacon. He was born at Chiselhurst, graduated at Corpus Christi College, Cambridge, in 1527, and was called to the bar in 1533. He held several royal appointments under Henry VIII. and Edward VI., and although a Protestant, escaped persecution under Mary, and was even allowed to retain his office in the Court of Wards and Liveries. After the accession of Elizabeth, he was Lord High Chancellor and Keeper of the Great Seal from 1558 to his death. Sir Nicholas was one of those solid and stately Englishmen to whose sagacity, high principles, and firm demeanor his country owed its safety in that critical period when Elizabeth mounted the throne.

BACON, Roger (c.1214-94). An English monk and philosopher. He was descended from a respectable family, and born at Ilchester, in Somersetshire, about 1214. Through the force of his intellect he raised himself far above his age, made remarkable discoveries in several branches of science, and contributed much to extend the then scanty knowledge of nature. The facts of his life, in the main, must be gathered from tradition and from references in various works. He studied at Oxford and then at Paris, where he received the degree of doctor of theology; and soon after his return to England, he entered the Order of the Franciscans and settled at Oxford. He carried on active studies and experimental researches, this latter work being done mainly in alchemy and optics. He was so far advanced in his discoveries as not only to arouse the jealousy of his associates and to create doubts as to his orthodoxy, but also to occasion his being accused of dealing in the black art of magic. In 1257, when Bonaventura was General of the Franciscan Order, Bacon was removed from Oxford, and for ten years confined at Paris without writing materials, books, or instruments. Among those who had heard of Bacon was Guy de Foulques, the Cardinal-Bishop of Sabina, at that time (1264) Papal legate in England, and later Pope Clement IV. He desired to see Bacon's writings, but the interdiction of the Franciscans prevented a compliance with his wish. On his accession to the Papacy as Clement IV., Bacon wrote to him, expressing his readiness to furnish him with whatever he desired, and Clement in reply repeated his request to see Bacon's works, despite the Franciscan prohibition. Bacon accordingly prepared his *Opus Majus* (edited by Jebb, 1733), which he sent to the Pope, it is said, by his favorite pupil, John of London, and in which he represented the necessity of a reformation in the sciences through different methods of studying the languages and of nature.

The *Opus Majus* was an encyclopædia of all science, embracing grammar and logic, mathematics, physics, experimental research, and moral philosophy, many of these branches being discussed at length in other works. How Clement received these books is not known, as they could only have reached him about the time he was seized with his last illness. For ten years after Clement's death, Bacon was free from open persecution at least. But in 1278, the General of the Franciscan Order, Jerome of Ascoli (later Pope Nicholas III.), declared himself against Bacon, forbade the reading of his books, and issued an order for his imprisonment, which was sanctioned by the Pope. This new imprisonment lasted ten years, and at its conclusion Bacon returned to Oxford. He wrote a *Compendium Studii Theologiæ* (1292), and shortly after died—probably in 1294.

Bacon, although an extraordinary genius, could not rid himself of all the beliefs and errors of his times. He believed in the 'philosopher's stone' and in astrology. Many inventions have been credited to him, but some of them were doubtless derived from the study of Arabian scientists. There are in his writings new and ingenious views on optics; e.g. on refraction, on the apparent magnitude of objects, on the great increase in the size of the sun and moon in the horizon. On other subjects, however, he fell into the greatest errors. He made several chemical discoveries, which were wonderful for that time. He knew, for instance, that with sulphur, saltpetre, and charcoal, we may produce a substance that would imitate lightning, and cause explosions,—in other words, gunpowder,—but its previous use by the Arabs has since been shown. Mathematics, applied to observation, he considered to be the only means of arriving at a knowledge of nature. He studied several languages, and wrote Latin with great elegance and clearness. Deserving of honorable mention are his discoveries of the errors that prevailed in the calendar. He prepared a rectified calendar (1263), of which a copy is preserved in the library of University College, Oxford. On account of his extensive knowledge, he received the name of 'Doctor Admirabilis.' Six of his works were printed between 1485 and 1614, and in 1733 S. Jebb edited the *Opus Majus.* Professor Brewer edited the *Opus Tertium, Opus Minus,* and *Compendium Philosophiæ,* published at London in 1859, under the title of *Opera Inedita.* Consult: Charles, *Bacon, sa vie, ses ouvrages, ses doctrines* (Paris, 1861); and the German works of Siebert (Marburg, 1861) and Held (Jena, 1881).

BACON BEE'TLE. A small dermestoid beetle (*Dermestes lardarius*), whose whitish-brown, hairy grub devours lard, leather, furs, etc., and is a pest in museums of stuffed animals.

BACON'GO. An African tribe inhabiting the upper Congo Valley. They are of fair stature. Their religion is a curious mixture of paganism with Christian customs, introduced by the Portuguese, their chief deity being feminine, and known as Nzambi, i.e. 'all-earth mother.' They have an apparently lax social organization, with an order of popular guardians of justice analogous to the secret orders of many primitive tribes. Consult Deniker, *The Races of Man* (London, 1900).

BACO'NIAN CON'TROVER'SY. See Bacon, Delia; and Shakespeare, William.

BA'CON'S REBEL'LION. An uprising of the Virginia colonists, particularly of the lower classes, under the leadership of Nathaniel Bacon (q.v.) against the colonial authorities, represented by Governor William Berkeley, in 1676. For some time before, taxes had been excessive and unfairly distributed, and colonial commerce had been greatly hampered and restricted (see Navigation Acts, The); the Assembly, since 1661, had been overbearing and wholly subservient to the Governor; and Governor Berkeley himself, besides showing gross favoritism, had exercised a virtual monopoly over the exceedingly profitable Indian trade. These facts combined to arouse a widespread feeling of discontent among the colonists; and this feeling was greatly intensified by the Governor's attitude toward the Indian outbreak in 1675, when he positively refused to take any effective measures to meet the threatened danger, but required, instead, that a certain number of forts be built with money to be raised by taxation. The Governor also prohibited the colonists from making any attacks on the Indians without his express orders. The Indian raids being renewed with especial violence early in 1676, and the forts proving to be altogether useless, 300 colonists assembled in disregard of the Governor's orders, and by acclamation chose Nathaniel Bacon as their leader. Though unable to procure a regular commission, Bacon accepted the position, marched against the Susquehannocks, and completely defeated them. On his return to Jamestown he was arrested, but soon afterwards was released on parole. The Governor, however, gave undeniable evidence of double dealing, and obstinately refused to sign Bacon's commission. Bacon thereupon marched upon Jamestown, captured it, and not only obtained a satisfactory commission as major-general, but also forced the Assembly to pass and the Governor to approve, a set of liberal acts which became known as 'Bacon's Laws,' and which temporarily reformed many of the worst abuses in the colony. Bacon then undertook a second expedition against the Indians, and in the battle of Bloody Run, near the present Richmond, again completely defeated them. The Governor, meanwhile, tried to raise a force hostile to Bacon, and Bacon thereupon marched a second time against Jamestown, which he besieged, captured, and on September 19, destroyed. On October 26, while marching to meet a hostile force under Major Brent, Bacon died in Gloucester County, of an attack of dysentery. With his death the rebellion ended. Berkeley's bloody revenge upon Bacon's followers elicited from Charles II. the famous comment, "The old fool has put to death more people in that naked country than I did here for the murder of my father." The causes of the rebellion, which is now regarded as having been a forerunner of the Revolution, were misrepresented by the authorities at the time, and were greatly misunderstood by historians until the discovery of many new documents bearing on the subject about 1890. Most of these documents have been published in the *Virginia Magazine of History* (Richmond, 1893-98). Consult an interesting and carefully written article by Edward Eggleston, entitled "Nathaniel Bacon, the Patriot of 1676," in the *Century Magazine*, Vol. XL. (New York, 1890), and the account in Fiske's *Old Virginia and Her Neighbours* (2 vols., Boston, 1897).

BA'CONTHORPE, BA'CON, or **BACHO,** bā'kō, JOHN (?-1346). An English schoolman and philosopher, styled *Doctor Resolutus*, or 'The Resolute Doctor.' He was born at Baconsthorpe (Norfolk). He entered the Carmelite Order, took his degrees as doctor of civil and canon law at the University of Paris, and from 1329 to 1333 was provincial of his order in England. He was the greatest of Carmelite scholars, and also the chief expositor of the doctrines of the Arabian philosopher Averroës. He wrote more than 120 works, widely read in the Middle Ages. Of them, many, including the *Commentaria super Quatuor Libres Sententiarum* (Paris, 1484), were published soon after the introduction of printing. Consult the critical works by Aymers (Turin, 1667-69) and Zagalia (Ferrara and Parma, 1696-1706).

BACOOR, bä'kō-ōr'. A town of Luzon, Philippines, in the Province of Cavité. It is situated about 10 miles southeast of Cavité, and within a short distance of the bay (Map: Luzon, E 9). Population, over 13,000.

BACSÁNYI, bŏ'chän-yê, JÁNOS (1763-1845). A Hungarian patriotic poet. He was born at Tapolcza, May 11, 1763, and died at Linz, May 12, 1845. His historical work, *The Valor of the Magyars*, first brought him into notice in 1785; and the same year he was appointed clerk in the treasury at Kaschau, where he soon after helped to found a periodical called the *Magyar Museum*. Bacsányi was at this time saturated with the spirit of the French Revolution, and the liberal tendency of his poems led to the confiscation of the *Museum* in 1792. Another liberal poem soon afterwards cost him his office, while his share in the conspiracy of Bishop Martinovich, in 1794, resulted in two years' imprisonment. When the French took Vienna in 1809, he translated Napoleon's proclamation to the Hungarians, and in consequence was forced to flee to Paris. After the Peace of Paris he was given up to the Austrian authorities, and had Linz assigned to him as a compulsory residence, but was allowed to receive his French pension until his death. Bacsányi exerted an important influence upon Hungarian literature, especially through his æsthetic writings in the *Magyar Museum* and elsewhere. He is remembered as one of the leading spirits of the 'Debreczin class' which sought to weld together the best elements of the contemporary rival schools, the classical and the popular, and thus paved the way for the modern academic period. Bacsányi was made a member of the Hungarian Academy in his eightieth year.

BACTE'RIA (plur. of Neo-Lat. *bacterium*, from Gk. βακτήριον, *baktērion*, dimin. of βάκτρον, *baktron*, staff, stick). A name applied to vegetable organisms—the most minute organisms known. The name was given to the first-discovered of these bodies because of their shape, but is now used to designate this entire class of organisms, although many well-known bacteria are not 'little rods' at all, but are round or oval in shape.

The first recorded observation of the bodies we now recognize as bacteria was made about the middle of the Seventeenth Century by Antony van Leeuwenhoek, a Holland lens-grinder, who reported his discoveries to the Royal Society of London in 1683. Continuing his investigations, Leeuwenhoek discovered the presence of bacteria in the mouth and in the intestinal evacuations; and it is interesting to note that there followed these discoveries a germ theory of disease no whit less far-reaching, if less accurate, than that which exists at the present day. In 1773 O. F. Müller established two genera, *Monas* and *Vibrio*. Not much progress was made, however, until about 1838, when Ehrenberg and Dujardin included bacteria in their investigations of minute organisms. They referred the forms which they described to the animal kingdom, classifying them among the Infusoria, and placing a large number of them under the general title of Vibronia. Nor was this reference surprising. The means at the disposal of these early investigators were extremely crude. They saw these minute moving bodies, and considered them animal in nature; for at that time naturalists had hardly begun to realize that animals have no monopoly of motility, though it is now a commonplace observation that the simplest plants exhibit a power of locomotion that is almost wholly lost in the higher forms. They were believed to develop spontaneously. It was not until the experiments of Cohn that the doctrine of spontaneous generation as applied to bacteria was overthrown, and Harvey's law, '*Omne vivum ex vivo*' ('All life comes from life') was accepted as having universal application.

Bacteria are found almost everywhere. They are present in air, water, soil, in most foods and drink, and are regular inhabitants of the mouth, stomach, and intestines, and of the superficial layers of the skin. The rancidity of butter, the putrefaction of cheese, the gamy flavor and high odor of meat, the yellowness and blueness of milk kept in imperfectly cleaned vessels, the excessive staleness of bread, and many other similar conditions in food, are largely due to the presence of bacteria. So-called bloody stains on bread, meat, paste, etc., have also been traced to the presence of a brightly colored micro-organism. In the same way the bitterness and ropiness of bad wine is brought about.

The air of the country, but especially that of cities, contains large numbers of bacteria. M. Miquel, in his laboratory at Montsouris, in Paris, constructed for the purpose of studying atmospheric germs, found that at Montsouris there were on the average about 80 bacteria to the cubic litre of air. The maximum abundance was in the autumn, the minimum in winter. The number increased at night, and was reduced by a heavy rainfall. The direction of the wind made a great difference. Thus, when the wind blew from the mountains, very few bacteria were found in the air; while, when the wind came from the direction of the city, the number was greatly increased.

Water, even that which is usually considered pure, contains bacteria in abundance. This is true of spring-water and of water from artesian wells. Stagnant water, and the water of sewers, of course, contain bacteria in immense numbers. The sulphurous springs of the Pyrenees contain an abundant bacterium (Beggiatoa), which accumulates sulphur in its body, and is especially abundant in the scum that floats on the surface. Some bacteria, called chromogenic (color-forming) on account of the bright pigment which they produce, sometimes occur in water, and have given rise to superstitious accounts of bloody rain. The red color of stagnant pools in autumn has been known for many years to be due to the presence of a micro-organism described by Ehrenberg as 'Ophidomonas sanguinea,' but now known as a species of Spirillum. Water serves as an excellent means for the transportation of bacteria, and many of the epidemics of infectious diseases are undoubtedly due to an infection of the water-supply.

As already noted, bacteria were at first placed in the animal kingdom. To Cohn (1853) is due the credit of first definitely proving, on the grounds of their structure and life-history, the fact that bacteria are plants. Nägeli (1857) confirmed the conclusions of Cohn, correcting certain details, and classifying bacteria not among the algæ, but as a parallel class of fungi. (See SCHIZOMYCETES.) Bacteria belong in that group of the vegetable kingdom whose members live on dead or live animal or vegetable matter. They are subdivided into two groups, according as they live on dead animal or vegetable matter, or on live animal or vegetable matter. The former are termed saprophytes, the latter parasites. The great importance of this distinction will appear when it is remembered that when bacteria are living on, i.e. destroying, dead matter, they are doing good. They are decomposing dead animals and plants into their constituent elements, and returning them to the mineral kingdom again to furnish food for plant-life. In such way all decay and decomposition take place. But if they live on, i.e. consume, live animals or vegetables, they are doing harm in the sense of destroying life; and it is to this group that all harmful bacteria belong.

CLASSIFICATION. Bacteria are divided, according to their shape, into three main groups—(1) *Bacilli*, or rod-shaped bacteria: These may occur singly, in pairs, or in long threads or strings, but invariably have one diameter greater than the other. (2) *Spirilli:* These, like the bacilli, have one long diameter, but they have a distinct curved or spiral form. They may be short, so that they appear as mere commas; or they may be long, wavy threads, or may occur as very long spirals known as Spirochetæ, or short, thick spirals called Vibros. (3) *Micrococci:* To this group belong all spherical or nearly spherical forms. The group has many subdivisions, according to the way in which the cocci arrange themselves. They are called Streptococci when they are arranged in rows like a string of beads. When they are in bunches like grapes, they are called Staphylococci. When grouped in pairs, Diplococci; when in fours, Tetrads; when groups of 8 to 16 are arranged as cubes, they are spoken of as Sarcinæ. Further subdivisions have been made based upon some peculiar property. Thus, *Zymnogenic* bacteria are those concerned in the bringing about of fermentation; while, to the subgroup of fermentative bacteria which cause putrefaction, the name of *Saprogenic* is applied.

STRUCTURE AND CHARACTERISTICS. Each bacterium is a single non-nucleated cell of protoplasm, and is endowed with the properties which belong to living organisms as such. Bacteria differ from one another in size and shape. It has been estimated that a single bacterium of average size weighs not more than $\frac{3}{200000000000}$ of a grain, and that 1500 of the rod-shaped forms placed end to end would about stretch across the head of an ordinary pin. It requires the highest powers of our microscopes to distinguish, not to say study, many of the forms. Many bacteria possess distinct powers of motion, due to the possession of long, hairlike appendages or *cilia*, which project from the body of the bacterium, and with a lashing motion propel it through any liquid medium in which it may be. This motility differs greatly in degree for different species, and for members of the same species under different conditions. It is confined mainly to the bacilli or rod-shaped bacteria, but has been observed in a few species of micrococci. Such motile micrococci possess flagellæ. Like all living things, bacteria nourish themselves from their surrounding media, taking up external substances as food and building them up into their own cell substance, at the same time giving off waste-products. Like other plants, bacteria differ from one another as regards suitable foods, some growing best in one soil, others in a soil quite different. Under the influence, apparently, of unfavorable nutritive conditions, certain bacilli have the property of passing from their ordinary condition into that known as 'spore formation.' This consists in the formation within the bacillus of a clear round or oval body; the spore, which, when fully developed, replaces completely the bacillus. The spore does not represent a phase of reproduction. A single bacillus can form but one spore. It seems to be a defense metamorphosis which the organism undergoes when its environment becomes unfavorable. When proper nutritive conditions again obtain, the organism returns to its more common form. When this occurs, a single spore produces but a single bacillus. The spore represents an inactive condition, inasmuch as there is no reproduction of spores. A most important significance of this spore-formation lies in the fact that being a defense-form, spores are much more resistant to the methods usually employed for destroying micro-organisms than are the bacilli from which they develop; and it was the failure to destroy spores that kept alive, for so long a time, the theory of spontaneous generation. Bacteria multiply by simple fission. They elongate, an indentation appears near the middle, and this is followed by complete division, forming two daughter-cells similar to the parent-cell. The different species of bacteria preserve their identity as carefully as do the higher vegetable organisms, a given species of bacteria never producing any but the same species. This reproduction of bacteria is, under favorable circumstances, exceedingly rapid—a bacterium reproducing itself in from 15 to 40 minutes. This would, in 24 hours, result in the production of many millions of bacteria from a single individual. Woodhead says, "Fortunately for us, they can seldom find food enough to carry on this wonderful reproduction. A large number die from want of food, and because of other conditions unfavorable to their existence."

Drying kills many species of bacteria; others simply remain inactive. Cold destroys many bacteria, though some are not killed by low temperatures. The typhoid bacillus can exist for many months frozen in a cake of ice, to become active and dangerous again when the ice is melted and used. Heat, especially moist heat, above a certain point, kills all bacteria; the application of heat to the destruction of bacteria is known as sterilization. Thus, boiling milk or water, or cooking meats or vegetables, destroys any bacteria that may have been present. The same applies to surgical dressings, such dressings being spoken of as sterile, or, because of the absence of infectious material, as aseptic. Certain chemical substances known as germicides, disinfectants, etc., are very inimical to bacteria, e.g. solutions of mercuric chloride, of carbolic acid, etc., and surgical dressings in which such chemicals are used are known as antiseptic dressings.

As has already been noted, those bacteria which live on dead animal and vegetable matter, the saprophytes, are conservative in their action. Upon them depends all destruction of dead animal and plant life. By the destructive action of bacteria, these dead bodies are broken down and their component elements returned to the soil, again to become food for plant-life. Were it not for the action of bacteria, the world would have long since been so filled with the remains of the dead, that there would be no room for the living. Thus the saprophytic forms of bacteria are absolutely essential to life.

It is, however, because of the relation of bacteria to certain diseases that these organisms have within the last few years come to occupy so much general public attention. The parasitic bacteria, in contradistinction to the saprophytic, live upon live animal or vegetable matter, and are therefore destructive to living organisms. The disease-producing bacteria are known as pathogenic. Many infectious diseases are positively known to be caused by bacteria, and there is excellent reason to think that all other infectious diseases are likewise due to bacteria, although measles, scarlet-fever, and other diseases have as yet baffled all efforts to discover their specific germs. The effects of disease-producing bacteria upon the body tissues may be grouped in three classes: (1) Effects due to the direct local action of the bacteria on the tissues, as the membrane in diphtheria. (2) Mechanical effects, as when a clump of bacteria get into a blood-vessel and block it (infectious embolus). (3) Effects due to the production in the body, under the influence of the bacteria, of certain chemical substances which act as poisons to the tissues. These poisons are in solution in the body fluids, and each poison is peculiar to the species of bacteria which produces it; e.g. the poison, or toxin, as it is called, of diphtheria is different from the toxin of typhoid fever.

The question presents itself as to why, when bacteria once start to grow on such a good culture-medium as the body, do they ever stop growing; or, in other words, why does one ever recover from an infectious disease? Our present belief is that there is produced in the body, as the result of the action of the bacteria, not only a toxin, but another chemical substance, which is antagonistic to the proliferation of the bacteria, and which is known as antitoxin. To the persistence in the body of this antitoxin is ascribed the immunity which a person who has had an infectious disease often has from that disease. Upon this principle is based the well-known diphtheria antitoxin. A fresh culture in bouillon of the diphtheria bacillus is allowed to stand until toxins are formed in the bouillon. It is then strained through a Pasteur filter, and a small amount is introduced into the body of a horse. Some days later a larger dose is given, and then constantly increasing quantities are injected during some months. The animal is thus rendered immune to the action of the toxin, and the fluid part, or serum, of its blood is the antitoxin now so successfully used in the treatment of diphtheria. See DIPHTHERIA.

Bacteria may be grown artificially on various substances which furnish them suitable food. These are known as *culture media*. Among the more common of these are bouillon, milk, and potato. In order to make a medium which is solid at ordinary temperatures, but which may be liquefied by slight heating, gelatin or agar is often added to the bouillon. Thus, if a drop of fluid containing bacteria which we wish to study be added to warm melted gelatin or agar bouillon, the latter may be poured out in a thin layer on a cold plate, where it immediately hardens, thus fixing the bacteria and preventing their moving about in the medium. If the dilution be sufficient to separate the bacteria well, as growth occurs, minute specks are seen dotting the surface of the plate, and each one of these specks marks the reproduction area of a single bacterium. It is called a colony, and each such colony consists of a single species of bacteria. By taking a bit from one of these spots or colonies and transferring it to some other sterile medium, there results a growth which is free from all life other than the single species of bacteria. This is known as a 'pure culture.' Many different species of bacteria so closely resemble one another in appearance that they cannot be differentiated by the microscope. Each species has, however, certain peculiarities of growth and development. Thus recourse is often had to cultivation upon different media, where their life-histories may be studied and the identity of a particular species determined. For the very careful study of bacteria, many different modifications of the culture-media have been devised. The medium is sometimes colored by litmus, to show any reaction the growth of the bacteria may produce. Sugar is sometimes added to the medium, which is then placed in a crooked tube closed at one end, so that if the species causes fermentation it may be noted by the collecting of gas at the closed end of the tube. All media are sterilized before using, to destroy any bacteria that may be present. After inoculation the media are kept at room temperature, or more often are placed in an incubator at about blood-heat.

For microscopical study, bacteria may be simply placed under a thin glass cover upon a glass slide. They may be studied unstained, but are more often stained in various ways, to render them more distinct or to bring out certain peculiarities. Some of the bacteria, e.g. the tubercle bacillus (see TUBERCULOSIS), depend for their recognition very largely upon their specific reaction to certain stains, and can be differentiated only in this way. They are usually studied with an oil-immersion lens of not less than 1000 diameter magnification. For history and bibliography, see DISEASE, GERM THEORY OF.

BACTE'RIAL FIL'TER-BEDS. See SEWAGE DISPOSAL.

BAC'TRIA. The name given in ancient times to a province or country in Central Asia extending northward from the Hindu-Kush Mountains as far as the river Oxus (Amu or Jihon), and called also Bactriana by classical writers. The exact extent of this land in early times cannot now be determined, but it must have been considerable; and, although barren to the north, its southern regions were rich in pasture lands, which made Bactria famous in antiquity, among other things, for its fine breed of horses. In history it has been the seat of a number of powerful rulers, who are best known as the successors of Alexander the Great in the East. What was formerly Bactria is now included in parts of Afghanistan and Asiatic Russia.

The name of the province or country appears in the Old Persian Inscriptions (Bh. i. 16; Dar. Pers. e. 16; NR. a. 23) as *Bāxtri*, i.e. Bakhtri. It is written in the Avesta *Bāxδi*. From this latter came the intermediate form *Bāxli*, Sanskrit *Bahlīka*, *Balhika* 'Bactrian,' Armen. *Bahl*, and by transposition, the Mod. Pers. *Balx*, i.e. Balkh. The capital city, Balkh (q.v.), or earlier Bactra, was situated on the Dargidus or Bactrus (now Dehas). This city seems also to be known in the classics as Zariaspa. In the Avesta (Vendīdād 1.6), and elsewhere, it receives the title 'beautiful' (Av. *srīra*), to which the attribute 'with banners on high' is appended. This additional designation of the capital of Bactria in ancient times was apparently due to the custom, mentioned by Masudi and Yakut, of pious pilgrims hanging green silk banners from the walls of the Temple Naubehar. This latter name has been supposed to refer to a Buddhist 'New Cloister' (*nava-vihāra*), as we know that Balkh, in the Province of Bactria, was a flourishing seat of Buddhism in the early Christian centuries.

Bactria is supposed to have been originally the centre of a powerful kingdom founded more than a thousand years before the Christian era, and exercising extensive sway throughout Iran. The strongest support for the existence of such a kingdom, antedating the Median rule and the Achæmenian sovereignty of the Persian Empire, will be found in Duncker, *Geschichte des Altertums* (Leipzig, 1878-86). One of the principal arguments brought forward in favor of such a view is the story of the campaign of Ninus of Assyria against a Bactrian king, Zoroaster, as mentioned by Ctesias, and recounted with some variations by Trogus Pompeius (in Justin), Eusebius, and others. The record seems to contain some allusion to Zoroaster, the Prophet of ancient Iran (q.v.), whose patron was Vishtaspa, and whose death occurred at Balkh, according to Firdausi and others, when the city was stormed by the Turanians. For this and similar reasons Bactria is often regarded as the cradle of the ancient Magian religion. (See ZOROASTER.) The bearing of all these passages in their historic light is discussed in Jackson, *Zoroaster, the Prophet of Ancient Iran* (New York, 1899). But considerable doubt is attached to the antiquity of the story of Zoroaster's death at Balkh; and so high an authority on Persian history as Justi disclaims the existence of a Bactrian kingdom before the time of Alexander the Great. Yet others may hold a different opinion. However the case may be, there is no doubt that Cyrus subjugated Bactria and made it a Persian province; and Darius in his inscriptions includes Bactria as one of the countries tributary to the Achæmenian power. Herodotus enumerates the forces which Bactria contributed to the Persian invasion of Greece.

From the time of Alexander, the history of Bactria becomes clearer, and may be followed with more detail. When he conquered the rest of Iran, Bactria likewise fell before his power, and he made Roxana, daughter of the Bactrian ruler Oxyartes, his wife, B.C. 327. On leaving Persia, he assigned a strong force of Greeks to occupy Bactria, and it thus became part of the kingdom of the Seleucidæ (q.v.). About B.C. 256, with the revolt of the satrap Diodotus I., a new Græco-Bactrian kingdom was established, whose power ultimately extended as far as Northern India, although in Iran it had to give place to the Parthian sway. The history of this later Græco-Bactrian kingdom has been cleared up, in large measure, by means of the coins and other antiquities which have been discovered in recent times, especially in Afghanistan. The Greek and later the Prakrit devices and inscriptions on these coins give a series of royal names whose succession has been fixed with comparative accuracy.

The inhabitants of ancient Bactria (modern *Balkh*) were closely related to the Persians, and shared in, if they did not produce, the old Aryan culture of this region from which sprang Zoroastrianism, the Indo-Bactrian alphabet, etc. It was in this part of the world that ethnologists formerly sought the primitive home of the Aryan stock, but that assumption is now largely abandoned. Nevertheless an early presence of Aryan peoples here is undoubted, and their influence went both east and west. Of recent literature, reference may be made to Biddulph's *Tribes of the Hindoo-Koosh* (London, 1881) and Geiger's *Die Pamir-Gebiete* (Vienna, 1887), besides the numerous studies of Ujfalvy on the Aryans of these regions, contained especially in his *Expédition scientifique française en Russie, en Sibérie, et dans le Turkestan* (Paris, 1878-80) and *Aus dem westlichen Himalaja* (Leipzig, 1884). On the general question of the Bactrian kingdom, consult: F. Justi, *Das baktrische Reich;* Geiger and Kuhn, *Grundriss der iranischen Philologie*, Vol. II. (Strassburg, 1895); Gutschmid, *Geschichte Irans* (Strassburg, 1887); Wilson, *Ariana Antiqua* (London, 1841); and Lassen, *Indische Alterthumskunde* (Bonn, 1849). On the coins, consult: Percy Gardner, *The Coins of the Greek and Scythic Kings of Bactria and India* (London, 1886); and E. Thomas, "Bactrian Coins," in *Journal of the Royal Asiatic Society* (London, 1873).

BAC′TRIAN CAM′EL. See CAMEL.

BACTRIAN SAGE, THE. An appellation of Zoroaster, the Persian Christ, who was a native of the hills of the upper Oxus. See ZOROASTER.

BAC′TRIS (Gk. βάκτρον, *baktron*, staff). A genus of palms, of which nearly fifty species are known, all of which are American. The leaves of some are pinnate, those of others entire. They are generally small palms, some of them very small, and with slender stems; those of *Bactris tenuis* being no thicker than a goose-quill. Some are spiny, and form thickets not easily traversed. *Bactris acanthocarpa* yields a thread that is exceedingly tough and is used for making nets. The maraja (*Bactris maraja*) palm produces large clusters of fruit, resembling small grapes, with a thin pulp of an agreeable subacid flavor. The stems of this species are used for walking-sticks.

BACTRITES, băk-trī′tēz (Gk. βάκτρον, *baktron*, staff, stick, in allusion to its straight form similar to that of Baculites). A genus of fossil cephalopods of the order Ammonoidea, and the only member of the family Bactritidæ. The shells are straight, very slender, and gently tapering, with a round or elliptical section. The siphuncle is situated near the ventral wall and is very delicate. The suture is a simple curve with a small ventral angular lobe over the siphuncle, and, in some species of elliptical section, an incipient lateral lobe. The protoconch or embryonic shell is egg-shaped and erect, and has no scar such as is found on the initial chamber of the Nautilus. Bactrites is of more than ordinary interest, because it seems to furnish one of those rare examples of a connecting link between two well-differentiated orders of animals; namely, the Nautiloidea and the Ammonoidea. The general form of the shell is that of Orthoceras, and the straight cone of Bactrites is a primitive character, as it is in Orthoceras, and not to be compared with the degraded uncoiled shells (Baculites) that are evolved in the senile (phylogerontic) stages of several Jurassic and Cretaceous races of Ammonoidea. The shape and position of the protoconch are very similar to that of Mimoceras (Goniatites) compressum, which shell is uncoiled in its early embryonic stages, but becomes closely wound in its adolescent stages. Moreover, one of the Nautiloidea, the genus Protobactrites, seems to afford an indication of the stock from which Bactrites itself was derived.

The genus Bactrites contains about fifteen species that range through all the formations from the Ordovician to the Trias, inclusive, with the exception of the Silurian, in which latter no members of the group have yet been found. See CEPHALOPODA.

BACULARD D'ARNAUD, bȧ′kụ′lär′där′nō′, FRANÇOIS. See ARNAUD, FRANÇOIS THOMAS DE BACULARD D'.

BACULITES, băk′ū-lī′tēz (Lat. *baculum*, staff, stick, in reference to its straight form). A genus of fossil cephalopods of the order Ammonoidea, family Macroscaphitidæ. The shells are usually found as segments of an elongated cone that tapers gently, and has an elliptical or ovate cross-section. The suture-line is quite complex, and indicates that these shells belong to an advanced race of ammonoids. In perfect specimens preserving the protoconch, the embryonic shell is seen to be closely coiled for several turns, and then to branch off on a tangent to the coil and maintain a straight condition throughout the remainder of its life. Several other genera included in the same family show similar aberrant phylogerontic forms that have all been derived from the normally coiled shells of earlier types. The genus Baculites contains about thirty species, all of which are found in rocks of the Cretaceous Age in both Europe and America. At one locality in France these shells are so abundant as to cause the name of 'Baculite limestone' to be given to the rock containing them. Very fine specimens, often of great size—four feet in length—have been found in the Black Hills of Dakota and Wyoming, and here have also been obtained specimens on which the mother-of-pearl presents more beautiful coloring than is to be found on any shells now living in the ocean. For illustration, see CEPHALOPODA, Plate II., figure 7. See CEPHALOPODA; CRETACEOUS SYSTEM.

BACUP, băk′ŭp. A manufacturing town of Lancashire, England, on the Lancashire and Yorkshire Railway, 22 miles north of Manchester (Map: England, D 3). The town was incorporated in 1882, and since that time great improvements have been made in its condition and appearance. Bacup owns its water-works and maintains public markets, parks, baths, and cemeteries. It also has a sewage farm for the utilization of the town refuse. It has a mechanics' institute, library, and a fine market-house, opened in 1867. Bacup has extensive cotton and woolen factories, dye-works, brass and iron foundries; and there are numerous coal-mines in the neighborhood. Coöperative stores on a large scale are carried on. Population, in 1891, 23,498; in 1901, 22,505.

BADAGAS, bȧ-dä′gȧz. One of the Dravidian tribes of the Nilgiri Hills in Southern India, somewhat shorter, darker-skinned, and longer-headed than the Todas, and probably less mixed with Aryan blood. They are not a disappearing people, but, aided by the policy of the Indian Government, hold their own, though burdened by the caste-system. Their name is said to signify 'northerners,' which indicates comparatively recent migration. They are monogamous, and have some curious marriage customs. (See DRAVIDIANS.) Of recent literature since Shortt's "Tribes of the Neilgherries," in the *Transactions of the Ethnological Society of London* for 1869, may be mentioned: Breeks, *An Account of the Primitive Tribes and Monuments of the Nilagiris* (London, 1873): Reclus, *Primitive Folk* (Eng. trans., New York, 1891); and Oppert, *On the Original Inhabitants of Bharatavarsa, India* (Eng. trans., London, 1894).

BADAGRY, bä′dȧ-grē′. A seaport of Southern Nigeria, British West Africa, situated west of Lagos, with which it is connected by lagoons. It was formerly the capital of a negro kingdom, and during the Portuguese occupation was an important slave-trading centre, with a population of 10,000. Since then it has diminished in importance and in population.

BADAJOZ, bä′dȧ-hōs′. *Sp. pron.* bä′ᴅȧ-ʜōth′ (anciently, Lat. *Pax Augusta*, 'Peace of Augustus' or *Batallium*, which the Moors turned into *Bax Augos, Bathaljus, Badaljoz*, whence *Badajoz*). An important town, seat of a bishopric, and capital of the Spanish province of the same name (Map: Spain, B 3). It is situated about 5 miles from the borders of Portugal, in a fertile district, on the left bank of the Guadiana, which is here crossed by a granite bridge of 32 arches. It is strongly fortified; and has a military hospital, an arsenal, and the old Cathedral of San Juan, built about the middle of the Thirteenth Century, with a splendid organ, and paintings by Mateo, Cerezo, and Morales. The last named was born at Badajoz. Considerable trade is carried on with Portugal, and there are manufactures of soap, coarse woolens, leather, hats, and delft-ware. Population, in 1887, 27,300; in 1897, 28,900. As one of the keys of Portugal, Badajoz has often been a place of importance in war. It was besieged in vain by the Portuguese in 1660, and again by the Allies in the War of the Spanish Succession, in 1705. During the French War, Badajoz was besieged by the French in 1808 and in 1809, and again in 1811, when it surrendered, March 11, to Soult. It was thrice besieged by the English under Wellington, and finally taken by storm, April 6, 1812.

BADAKHSHAN, bä′dȧᴋ-shän′ (Pers., Hind. *bad*, region, district + *Oxus*, river). A district of northeastern Afghanistan, lying directly north of Cabul, on the edge of the Pamir Plateau. The Amu Darya or Oxus River flows along its northwestern border. The capital is Faizabad. It is a region of great fertility. The inhabitants are in great part Tajiks, a Persian-speaking Aryan race. They are Mohammedans—Shiites in the mountains and Sunnites in the plains. The population is estimated at 100,000. One of their chief occupations is man-stealing—their captives being chiefly Kafirs and Chitrali from the Indian side of the Hindu-Kush. The people of Badakhshan seem to have been always under the immediate rule of their own chiefs, at the head of whom was the Ameer. They have generally, however, formed part of some great empire. In the Eighteenth Century Badakhshan constituted a part of the empire of Nadir Shah, after whose death it became subject to the Afghans. After many revolts and changes it was confirmed to Afghanistan by the Anglo-Russian agreement of 1873. Consult: Yule, *Marco Polo* (London, 1871); Vambéry, *Central Asia* (London, 1874).

BADALONA, bä′dȧ-lō′nȧ (*Baetulo, Betulo* of the Romans). A seaport town of Spain, in the Province of Barcelona, 5 miles by rail northeast of the city of Barcelona (Map: Spain, G 2). It is situated in a fertile region; has orange-growing, wine-making interests, mechanical industries represented in shipyards, glass-works, sugar and petroleum refineries, chemical-works, etc. A considerable coastwise trade is carried on. Population in 1887, 15,974; in 1897, 18,075.

BADDECK′ (from the Fr. *Bedeque* for Ind. *Ebĕdĕk*). A seaport, fishing village, and favorite summer resort on Cape Breton Island, Lake Bras d'Or, and the capital of Victoria County, Nova Scotia, Canada (Map: Nova Scotia, J 3). It is celebrated by Charles Dudley Warner in *Baddeck, and That Sort of Thing* (Boston, 1874). Population, in 1901, 1235.

BADEAU, bȧ-dō′, ADAM (1831-95). An American soldier and author. He was born in New York City, was educated in Tarrytown, N. Y., and in 1862 entered the Federal Army as an aide to Gen. T. W. Sherman. In May, 1863, he was severely wounded while leading an assault on Port Hudson (q.v.), and in March, 1864, became military secretary to General Grant, on whose staff he served until 1869, when he retired from the service with the regular rank of colonel and the brevet rank of brigadier-general. He was afterwards secretary of legation in London (1869), consul-general there from 1870 to 1881, and consul-general at Havana from 1882 to 1884. In 1877 and 1878, he accompanied General Grant on a portion of his tour around the world. He published a collection of essays entitled *The Vagabond* (1859); *A Military History of Ulysses S. Grant*, 3 vols. (1867-81); *Conspiracy: A Cuban Romance* (1885); *Aristocracy in England* (1886); and *Grant in Peace* (1886).

BADEBEC, bȧd′bĕk′. In Rabelais's *Pantagruel*, the wife of Gargantua and mother of Pantagruel. She died at his birth, after bringing forth at the same time 900 dromedaries, 7 camels, and a number of wagons, all laden with provisions.

BADEN, bä′den. A grand duchy of the German Empire, the fourth State in size and the fifth in population, situated at the southwestern end of the Empire (Map: Germany, C 4). It covers an area of 5821 square miles, exclusive of its share of the Lake of Constance. Its boundaries are formed by the Rhine on the west and the south, which separates it from the Rhine-Palatinate, Alsace, and Switzerland; Württemberg and Hohenzollern on the east; and Bavaria and Hesse on the north.

Surface and Hydrography. About 84 per cent. of the total area of the grand duchy is covered with mountains and hills. The chief mountain system is the Schwarzwald (see Black Forest), a narrow range of wooded mountains extending from Basel in a northeasterly direction for about 100 miles along the Rhine Valley. It terminates at Pforzheim, descending gradually into the plateau of the Neckar in Württemberg. The highest peaks, as the Feldberg (4900 feet and Belchen (4600 feet), are found in the upper or southern part of the Schwarzwald, which has a mean altitude of 3170 feet. The Odenwald range, situated at the northern end of the grand duchy, has a mean altitude of about 1500 feet. One of the most remarkable mountain-groups is the Kaiserstuhl, or 'Emperor's seat,' situated between Altbreisach and Endingen. Its base is about 23 miles in circumference and its highest summit reaches an altitude of over 1800 feet.

Baden is drained by the Rhine, which receives the Neckar and smaller streams, and by the Danube, which takes its rise in the Schwarzwald. There are several mountain lakes in Baden, some of them situated at a great altitude; and a part of the Lake of Constance is also included in the domains of the grand duchy.

The climate of Baden is, on the whole, very warm, but its temperature varies considerably on account of its uneven surface. The average yearly temperature is about 51° F. in the plains and 44° in the highlands.

Agriculture and Forestry. In spite of its mountainous surface, Baden is one of the most productive parts of Germany. Abundantly watered and well-cultivated, its soil has been brought to a high state of productivity, not only in the valleys, but also in the hilly regions. Nearly 57 per cent. of the total area of productive land is under tillage and about 38 per cent. under forests. Of agricultural products, the most important are wheat, rye, barley, oats, potatoes, several kinds of beets and grasses, etc. Tobacco is cultivated extensively, the annual crop amounting to about 20,000,000 kg. (about 45,000,000 lbs.), valued at over 15,000,000 marks ($3,570,000). Wine is one of the staples of Baden, and the Baden brands are included among the best in Germany. The centre of viticulture is the Circle of Freiburg, which contains about 50 per cent. of the total area under vine. The annual product was valued at $6,000,000 at the end of the century. The extensive forests of Baden are exploited on a large scale. The Schwarzwald region yields the best timber for ship-building, which finds its way chiefly to Holland. The annual output of timber is valued at 20,000,000 marks ($4,760,000), of which fully one-third is exported. Cattle-raising is also an important and progressive industry.

The mineral production is of little value, the annual product amounting only to about 8,000,000 marks ($1,900,000). The chief minerals are salt and coal, and the total number of people engaged in mining is about 2400.

Manufacturing and Commerce. Since its incorporation with the customs union of Germany in 1835, Baden's industrial conditions have undergone a rapid extension. During the period 1882-95 the number of people engaged in manufacturing increased from 204,542 to 287,450. The manufacturing industries are centred chiefly in the two circles of Karlsruhe and Mannheim. Foremost among them are the cotton and silk mills and to a lesser extent the woolen and linen mills. There are also extensive manufactures of jewelry, mirrors, machinery, leather, paper, cigars, and woodenware. Baden also contains one of the largest sugar-mills in Germany and several large chemical factories. Watch-making is an important industry in the Schwarzwald region, employing over 11,000 people. Baden is well fitted for commerce by its extensive waterways, and by its railways, which have a total length of over 1100 miles. Mannheim is the chief commercial centre of Baden, and one of the busiest ports on the Upper Rhine.

Government. The constitution of Baden dates from August 22, 1818. The sovereignty is vested in the eldest of the male line, which failing, the female inherits. The sovereign is bound by the constitution. Parliament is summoned every two years and is divided into two chambers. The Upper Chamber is composed of the princes (of full age) of the grand-ducal house, the heads of the seigniorial families, 8 members elected for eight years by the landed nobility, the Archbishop of Freiburg and the Protestant prelate, 2 representatives of the State universities, and 8 members appointed by the Grand Duke regardless of rank or birth. The Lower Chamber is composed of 63 representatives returned by 56 election districts (Karlsruhe and Mannheim sending 3 each, and Freiburg, Heidelberg, and Pforzheim, 2 each). The members of the Lower House are elected indirectly for a period of 4 years, half of the members retiring every 2 years. Every male citizen 25 years old or over has the right to vote, and every male citizen after reaching the age of 30, is eligible to office. Baden is represented by 3 members in the Bundesrat and 14 deputies in the Reichstag of the Empire. For purposes of administration it is divided into 11 circles. The Council of State is divided into the four ministries of the interior (including commerce, industry, and agriculture); foreign affairs (including railways, posts, and telegraphs); justice, worship and instruction, and finance. The capital is Karlsruhe, with a population in 1900 of 97,000.

The revenue is derived mainly from direct and indirect taxes, domains, railways, and customs. The budget of Baden is characterized by extreme fluctuations. Thus in 1900-01 the revenue and expenditures are given as 149,600,000 marks ($35,604,000) and 158,500,000 marks ($37,723,000) respectively. The railway debt of Baden (the only indebtedness of the grand duchy) amounted at the beginning of 1900 to 333,367,804 marks ($79,341,537).

Public Instruction. The institutions for higher education, viz. the two universities of Heidelberg and Freiburg, as well as the technological and the art school of Karlsruhe, are under the supervision of the minister of worship and instruction. The secondary and elementary schools are under the control of the board of education and the different local boards and commissioners. The elementary schools, which are almost exclusively public, number over 1600. The schools for secondary education number about 100, excluding the numerous trade-schools, seminaries, teachers' institutes, etc. Religious freedom is guaranteed to every citizen, and all the churches represented receive State aid. In military affairs, Baden is under the control of the Federal Government, and its military contingent constitutes almost the entire Fourteenth Army Corps of the Empire.

Population. The population of Baden in 1900 was 1,866,584, compared with 1,657,867 in 1890. In 1810 Baden had 1,000,000 inhabitants, and has therefore almost doubled its population in a century. Of the total population, a little over 61 per cent. are Roman Catholics, 37 per cent. are Protestants, and about 1 per cent. Jews. The population is very homogeneous, nearly 99 per cent. being German (including 91 per cent. natives of Baden) and only 1 per cent. foreign. A comparison of the two industrial censuses of 1895 and 1882 reveals clearly the tendency in the economic development of the country. The proportion of the population engaged in agriculture shows a decrease for 1882-95 of 7 per cent.; while the proportion engaged in manufacturing and other industries shows an increase of 3 per cent. for the same period, with a corresponding increase in the number engaged in commerce and transportation and in persons without occupation.

History. The original inhabitants of Baden were the Alemanni. They were conquered by the Franks under Clovis in 496, and were Christianized. They made repeated attempts to regain their independence, but in vain; and the dukedom of the Alemanni was abolished in 748 by Pepin the Short. In the Eleventh Century, Duke Berthold, a supposed descendant of the Alemannian Gottfried, built the castle of Zähringen in Breisgau, and with him begins the unbroken line of the princes of the house of Zähringen. Berthold's second son, Hermann, took the title of Margrave of Baden, and became the founder of the still flourishing house of Baden. He died in 1074. The history of this house presents for several generations little else but a succession of partitions of the territories among brothers, to be again and again reunited upon one or other of the collateral branches becoming extinct. The prosperity of the country was thus greatly retarded. From the time of the Reformation there existed two lines, those of Baden-Baden and Baden-Durlach, which were united in 1771. The present capital, Karlsruhe, was built in 1715 by the Margrave of Baden-Durlach, Charles William. His grandson, Charles Frederick, favored the policy of Napoleon and joined the Confederation of the Rhine. By this move he doubled his possessions in extent and population, and acquired successively the titles of Elector and Grand Duke. In 1811 he was succeeded by his grandson, Charles Louis Frederick, who, five years before, had married Stephanie, an adopted daughter of Napoleon. After the battle of Leipzig this prince seceded from the Confederation of the Rhine, and (1815) joined the German Confederation.

In 1818 the Grand Duke Charles granted the charter which forms the basis of the present constitution. He was succeeded in the same year by his uncle, Louis, who was inclined to absolutism, and had to contend at first with a powerful opposition. He succeeded, in 1825, in carrying through an alteration of the Constitution, extending the duration of the diets; after which the Government and the chambers acted more harmoniously. Louis died childless (1830), and was succeeded by his half-brother, Leopold. The known liberal tendencies of this prince promised at first a new life to constitutional government; but the tide of reaction, which became strong after the failure of the Polish insurrection and the fall of Warsaw in 1831, soon seized upon the Government, and the act establishing the freedom of the press, which had been passed in 1831, was in 1832 declared abrogated. A fluctuating contest between a reactionary Government and a growing opposition was carried on till 1846, when the Constitutionalist Bekk was made minister of the interior, and liberalism thus placed at the helm. The first effect was to calm the public mind, and to cause a split between the Liberals and the Radicals. The ninth parliament met (December, 1847) under the most friendly and promising auspices, but the French Revolution of February, 1848, suddenly aroused the Radical party to the most violent activity. Not satisfied with a multitude of liberal measures passed by the legislature, the revolutionary leaders, Hecker and Struve, aimed at establishing a republic, and stirred up an insurrection. The army sided with the insurgents, the Grand Duke fled, and a constituent assembly was called. The Grand Duke had recourse to Prussian aid, and, after several battles, was reinstated on his throne. Upon the whole, the reactionary tendency was less marked in Baden than in most other German States. In 1859 a conflict between the authorities of the State and the Roman Catholic hierarchy ended in favor of the latter; in 1861 the complete independence of the Catholic Church was recognized by a definite settlement, and a like privilege was extended to the Protestant Church of Baden. In the war between Prussia and Austria, in 1866, Baden lent aid to the latter, and on the declaration of peace was obliged to pay a heavy indemnity, and to reorganize her army on the Prussian model. In 1867 Baden entered the North-German Confederation. In 1870-71 the troops of Baden fought with distinction in the Franco-German War, and the grand duchy became a part of the new-born German Empire. The present Grand Duke is Frederick I. (born September 9, 1826: regent, 1852; Grand Duke, 1856). See Germany.

Consult: Wörl und Bader, *Geographie und Statistik des Grossherzogthums Baden* (Freiburg, 1880); *Das Grossherzogthum Baden in geographischer, naturwissenschaftlicher, etc., Hinsicht dargestellt* (Karlsruhe, 1885); Weech, *Badische Geschichte* (Karlsruhe, 1890); *Regesten der Markgrafen von Baden und Hochberg* (Innsbrück, 1892).

BADEN (Ger., baths). A watering-place in the Canton of Aargau, Switzerland, on the Limmat, 1260 feet above the sea, 13 miles northwest of Zürich. It was known to the Romans as *Thermæ Helveticæ*, and under the Hapsburgs was a mediæval stronghold of importance. Its waters are considered beneficial for gout, rheumatism, and diseases of the throat and lungs. Population, in 1900, 6100.

BADEN, or Baden bei Wien (Ger., baths near Vienna). A watering-place of Lower Austria, beautifully situated on the Schwechat, about 15 miles southwest of Vienna (Map: Austria, E 2). Its warm sulphur springs, 13 in number, vary in temperature from 72° to 97° F. The town has the usual accessories of a fashionable watering-resort—large bathing establishments, cursaal. trinkhalle, summer theatre, etc. In the neighborhood are numerous villas belonging to the Austrian nobility. Baden was known in the time of Marcus Aurelius as *Thermæ Pannonicæ* (Pannonian Springs). In recent years a number of Roman antiquities, including coins, have been unearthed. It was made a city in 1840. About four miles from Baden is Meierling, a royal hunting-lodge (now a convent), where Crown Prince Rudolph of Austria met his tragic death in 1889. Population, in 1890, 15,800; in 1900, 17,700.

BADEN. A town and fashionable health resort of the Grand Duchy of Baden, about 20 miles southwest of Karlsruhe, situated in the pleasant valley of the Oosbach River, at the edge of the Black Forest (Map: Germany, C 4). It is chiefly celebrated for its hot saline springs, which were famous in the time of the Romans. They range in temperature from 115° to 153° F., and are recommended for the treatment of rheumatism, gout, and diseases of the kidneys and skin. Among the chief buildings and objects of interest in Baden and its vicinity are the ruins of the old castle, once the residence of the margraves of Baden; and the new castle, now the summer residence of the Grand Duke; the Pfarrkirche; the Anglican and Greek churches; the trinkhalle, museum, luxurious bathing establishments, and the Nunnery of Lichtenthal, founded in 1245. The principal industry is wood-carving. The town Baden was known to the Romans as Civitas Aurelia Aquensis (watering-place of Aurelius). It was burned by the French in 1689. Population, in 1895, 14,862; in 1900, 15,700. At the height of the summer season, the influx of visitors quintuples the number of the resident population.

BADEN-POWELL, bā′den-pou″l, Sir GEORGE SMYTH (1847-98). An English politician and author, born at Oxford. He graduated at Balliol College, Oxford, in 1875, in 1877 was appointed private secretary to the Governor of Victoria, and in 1885 was returned to Parliament as a Conservative for the Kirkdale Division of Liverpool. In 1886 he established a new steamship line, running from Vancouver to Yokohama, in 1886-87 and 1891 investigated the dispute between Canada and the United States concerning the Bering Sea fisheries, and in 1893 was expert agent for the Government in the conduct of the British case before the tribunal at Paris. He published *Protection and Bad Times* (1879); *State Aid and State Interference* (1882), also in protest against protection; and an anti-Home Rule work, *The Saving of Ireland, Industrial, Financial, Political* (1898).

BADEN-POWELL, ROBERT STEPHENSON SMYTH (1857—). A British major-general. He entered the army in 1876, and served in India, Afghanistan, and South Africa, where he became assistant military secretary (1887-89) and occupied the same position at Malta (1890-93). He afterwards served with distinction in Ashanti, as commander of the native levies (1895), and in the Matabele campaign. In 1897 he became colonel of the Fifth Dragoon Guards. During the Boer War, Colonel Baden-Powell, with a force of 1200 men, was besieged for 215 days by a large Boer army in the town of Mafeking, and notwithstanding famine and sickness and a number of desperate assaults by the Boers, he held out until he was relieved (May 18, 1900). In recognition of his great ability and imperturbable coolness in conducting the defense, he was advanced to the rank of major-general. He became chief of the South African Constabulary, a force of 1200 men, in 1900. His principal publications are: *Pig-Sticking or Hog-Hunting* (1889); *Reconnoissance and Scouting* (1890); *Vedette* (1890); *Cavalry Instruction* (1895); *The Downfall of Prempeh* (1896); *The Matabele Campaign* (1896).

BADGE, or COGNISANCE (Low Lat. *bagea*, *bagia*, OF. *bage*, sign; cf. AS. *beág*, *beáh*, ring, ornament, Low Lat. *baga*, Fr. *bague*, ring). A figure either selected by the owner from some part of the family coat, or chosen as alluding to his name, office, or estate, or granted by the sovereign as a token of his favor. Badges were much used in England from Edward I. to Elizabeth. The principal noble houses, in imitation of the royal family, had a distinctive mark for their retainers, the whole coat of arms being often too complicated to reproduce. Some of these badges are well known in history, and many have been perpetuated in the signs of old inns, where the memory of their origin has been lost. Such are the white hart of Richard II., the bear and ragged staff of Warwick, the three feathers of the Prince of Wales (though King Stephen used this badge before the Black Prince's time), and the roses of York and Lancaster. Queen Anne was the last English sovereign to use a personal badge; she had the rose of England and the thistle of Scotland growing from one stem and imperially crowned. The term is loosely applied at the present time to various society emblems. See the illustration accompanying the article FRATERNITIES, COLLEGE.

BADGER, bāj′ẽr (probably from *badge*, alluding to the white mark on its head). Any of several small, burrowing carnivores of various genera, scattered throughout the warm and temperate parts of America, Asia, and Europe, and constituting, with the skunks, to which they are closely allied, the sub-family Melinæ in the family Mustelidæ. The group is characterized mainly by short, strong legs, elongated and more or less plantigrade feet, and straight, strong, fossorial toes. All are heavily furred, distinctly marked, and possessed of great strength, acuteness, and courage. They inhabit dens and are abroad mostly at night. They are provided with perineal glands, which contain substances emitting a fetid odor, the service of which, probably, is to attract the sexes. The pelts have considerable value as furs, and the hairs are largely used in making artists' brushes. The flesh is edible, but not often eaten in civilized communities.

THE AMERICAN BADGER (*Taxidea Americana*) is about 2 feet long, and has an appearance of remarkable breadth and flatness. The legs are short and firm, and the large feet are furnished with long and very strong claws, making them powerful digging tools. The tail is short and thick. The head is broad, massive, and doglike, with round, furry ears, a hairy muzzle, and jaws filled with formidable teeth, scarcely less serviceable than those of the wolverine. The whole squat, compact, large-boned, massively skulled form indicates great muscular power; and it is controlled by a well-developed brain and great courage. The loose fur is a blend of blackish with white, gray, or tawny, except as to the feet, which are blackish brown. The head is strikingly marked, the general color, from the back of the neck forward, dark brown, broken by a distinct white stripe from the bridge of the nose back to the nape of the neck, and a somewhat irregular white stripe on each cheek, reaching from the corners of the mouth to near the top of the ears. Below this on each side is a crescent-shaped, dark-colored patch, separating the patch from the white of the ears and throat. These conspicuous markings give to the countenance an expression of native ability and shrewdness in the disguise of a painted clown. This animal formerly ranged from Ohio westward, but now is not known east of the dry plains, except in Minnesota. It is found northward to Hudson Bay and southward into Mexico, where the local variety is called *tejon*. The badger's stronghold is in the arid regions that abound in gophers and similar burrowing rodents, which he digs out with ease or sometimes catches by a leaping chase. These form his principal food, and he is likely to seize and enlarge their burrows for himself; but birds, frogs, lizards, snakes, insects—in short, any animal food not carrion—are welcome to him. He does not hibernate in winter, but fares the best he can, mainly by digging out the torpid or snugly ensconced striped squirrels, prairie-dogs, and other small animals from their underground retreats; and in this practice he serves the agriculturist a friendly turn. Young badgers occasionally are captured, and make interesting though hardly affectionate pets. They exhibit amazing strength in moving barriers and breaking bonds. See plate of MINOR AMERICAN CARNIVORES with CARNIVORA.

THE EUROPEAN BADGER (*Meles taxus*) is similar to the American in size and colors, but different in dentition and other details. In the absence of open plains, it haunts deeply wooded places, and digs a deep chamber, where it spends the winter, and where in spring four or five naked and blind young are produced. It is omnivorous in a wild state, as well as in confinement; fruits, roots, beech-mast, eggs, young birds, small quadrupeds, frogs, snails, worms, and insects, equally constitute its natural food. It has been known to visit a garden for strawberries. It is also fond of honey and of the larvæ of wasps and wild bees, for which it digs up their nests, its shaggy hair protecting it from their stings. Its strength and courage are conspicuous. A barbarous sport was formerly practiced, called badger-baiting or 'drawing the badger.' A badger kept in a burrow or a barrel was assailed by dogs, until at last, yielding to superior numbers, it was dragged out, upon which it was released and permitted to go back to its den, to recover itself, and be baited again. This often happened several times daily when the badger was kept as an attraction to a public house of the low sort. The verb *to badger*, expressive of persevering annoyance by numerous assailants, arose from this practice. An old English name for the animal was 'grey,' and in Scotland and northern England the badger is still called a 'brock' (see *Twelfth Night*, Act. ii, Scene 5), and is frequently domesticated. Several closely related species belong to the Asiatic fauna, where, also, are other relatives of different genera.

The SAND BADGER, or BALISAUR (*Arctonyx collaris*), of Northeastern India and Assam, is a yellowish animal, taller and larger than the common badger, and looking like a small bear. It is nocturnal and omnivorous in habits, and is considered very fierce. The STINKING BADGER, or TELEDU (*Mydaus meliceps*), is an odd little burrower and insect-eater of Java, with a skunk-like power of emitting a powerful stench. H. O. Forbes says of this animal: "Another slow prowler, the *Mydaus meliceps*, very often made my evening hours quite unbearable by the intensely offensive odor with which, even in its most inoffensive frame of mind, it hedged its crepuscular walks for at least a mile around . . . with a malignant scent that clung to one's garments, furniture, and food for weeks. . . . The natives have a superstition that if a man has fortitude enough to eat its flesh he will have become proof against sickness of all kinds."

The common HONEY BADGER of India, and the RATEL, or CAPE BADGER, of South Africa, are somewhat more distant relatives, closely allied to each other and forming the genus Mellivora. Their coloration is peculiar, all the upper surface of the body, head, and tail being ashy gray, while the lower parts, separated by a distinct longitudinal boundary-line, are black. Both are vigorous diggers, and are even accused of robbing graves. Their generic name alludes to their observed fondness for honey (the ratel really hunts for bees with great sagacity), but they subsist upon living animals. Certain small raccoon-like animals of India and eastward, constituting the genus Helictis, and the Cape polecat (*Ictonyx zorilla*) of South and West Africa, which is remarkably like an American skunk in appearance and habits, complete the group.

BADGER, GEORGE EDMUND (1795-1866). An American statesman, born at Newbern, N. C. He graduated at Yale in 1813, studied law, and practiced in Raleigh. In 1841 he was appointed Secretary of the Navy by President Harrison, but after Harrison's death resigned because he disapproved of President Tyler's veto of the Bank Bill. He was elected to the Senate in 1846 to fill a vacancy, and in 1848 to a full term. He was an opponent of secession.

BADGER, OSCAR L. (1823-99). An American naval officer, born at Windham, Conn. He entered the navy as midshipman, and served during the Mexican War. In 1861-62 he was in command of the *Anacostia*, of the Potomac flotilla, and for the precision of his fire was frequently mentioned in the reports of Lieutenant Wyman, commanding the flotilla. He was promoted to be lieutenant-commander in 1862, and in 1863 commanded the ironclads *Montauk* and *Patapsco* in many engagements with the batteries and forts of Charleston Harbor. In 1863, while acting fleet-captain on board the flagship *Weehawken*, he was severely wounded. In 1866 he was appointed commander, and in 1881 commodore.

BADGER DOG. A dog formerly used in hunting or in baiting badgers. In England, the basset, an almost extinct breed of medium-sized, long-bodied, short-legged hounds, was so used;

and the German dachshund (q.v.) of the present originated in a breed adapted to pursuing badgers into their holes, the word meaning 'badger-dog.' It is said that the greyhound had a similar origin; but although a coarse sort of greyhound may probably have been used often in the sport of baiting badgers (called 'greys'), this breed originated otherwise in the Orient.

BADGER STATE. See States, Popular Names of.

BADGHIS, bäd-gēz′, or **BADGHIZ** (Pers., 'the place where the wind rises'). A region in the northwestern part of Afghanistan, bounded by the Heri-Rud and the Persian and Russian frontiers. It is mountainous in the centre, taking in a portion of the Paropamisus Range. The southeastern portion is less elevated and fertile. It is inhabited by Jamshidis and Hazaras.

BADHAM, băd′*a*m, Charles (1813-84). An English classical scholar, professor of classics and logic at the University of Sydney, New South Wales, from 1867 until his death. He was born at Glasgow, Scotland, and received his early education under Pestalozzi. He graduated at Oxford (1837). His chief publications are: *Criticism Applied to Shakspere* (1846), and annotated editions of the Greek classics, including the *Iphigenia* and *Helena* of Euripides (1851); and the *Philebus*, *Euthydemus*, and *Laches* of Plato. In his criticisms he followed the methods of Porson.

BADIA Y LEBLICH, bȧ-dē′ȧ ē lȧ-blēch′, Domingo (1766-1818), known also by the name Ali-Bei-el-Abbassi. A Spanish traveler. He was born at Barcelona, and studied the Arabic language, physical science, and mathematics at Valencia. Partly out of personal curiosity and partly as an emissary of the Spanish Government, he determined to visit the Barbary States in the disguise of a Mussulman. He went for a short time to London to study commerce and politics, and spared no labor to make himself familiar with the manners and customs of the people he was about to visit. In 1803 he sailed for Africa, where he represented himself, under the name of Ali-Bei, as a descendant of the Abbassides. His talents gained for him such esteem that he was invited to the court of the Emperor of Fez and Morocco. After a two years' residence in Morocco, he set out on a pilgrimage to Mecca in 1805, and after sojourning some time in Tripoli, Cyprus, and Egypt, arrrived at the 'holy place' in 1807, being the first Christian to visit it since the institution of Islam. Subsequently he visited Jerusalem and the chief places in Palestine and Syria, and in the autumn of 1807 arrived at Constantinople, whence he had soon to flee, the reality of his Mohammedanism being suspected. His long journey had been a bold masquerade, carried out with exquisite art. He deceived Moslem emperors and scholars; and in Cairo, Châteaubriand spoke of him as the most cultured and polished Mussulman he had ever met. After his return to Spain he was made Intendant of Segovia and Prefect of Cordova by Joseph Bonaparte. On the expulsion of the French, Ali was compelled to leave the country. He went to Paris, where in 1814 he published an account of his travels, under the title *Voyages d'Ali-Bei en Afrique et en Asie pendant les années 1803-07*. The work was translated into the principal European languages. Four years after the publication Badia y Leblich set off on another journey to the East, but died suddenly at Aleppo.

BADINGUET, bȧ′dăɴ′gȧ′. Napoleon III., often so called because the garments in which, in 1846, he escaped from the Castle of Ham, belonged to a mason of that name. His party came to be known thereafter as the 'Badingueux.'

BADIUS, bä′dê-ụs, Jodocus, or Josse (1462-1535). An eminent French printer and author. He was born at Asche, near Brussels, and for this reason is sometimes called Ascensianus. He studied at Brussels and Ferrara, and for several years taught Greek at Lyons. About 1500 he settled in Paris, where he founded a printing establishment, and published, with his own notes, a large collection of the classics; also produced a *Life of Thomas à Kempis*, and a satire on the follies of women, called *Navicula Stultarum Mulierum*. His printer's stamp is the oldest known reproduction of a printing-press.

BAD LANDS. An American term applied to regions of unconsolidated rocks that have been extensively eroded. Bad Lands occur on arid plateaus formed by horizontal strata of loosely cemented sands and gravels. In these regions rain falls only during short periods, but then the storm waters erode the incoherent rock that is unprotected by vegetation, resulting in the formation of a labyrinthine series of valleys of all sizes, most of which are dry 'arroyos' during the greater part of the year. When the erosion is carried to its extreme limit the greater part of the region is reduced to base-level, and isolated fragments of the old plateau rise above this to form table mountains, or 'mesas.' The best examples of Bad Lands are found in the upper portion of the Missouri drainage basin, in the vicinity of the Black Hills. They occur also to lesser extent in Colorado, Arizona, New Mexico, and Texas. The name 'Bad Lands' is a literal translation of 'Mauvaises Terres,' a term used by the French-Canadian trappers, who first visited the regions.

BAD′MAN, The Life and Death of Mr. An allegorical tale by John Bunyan, in 1680. It is the story of a petty villain of the middle classes. As a realistic picture of the masses during Charles II.'s reign, it is quite as vivid as anything of Defoe's or Pepys's.

BAD′MINTON (from Badminton, England, the seat of the Duke of Beaufort). A game which somewhat resembles lawn tennis. It can be played either in or out of doors, on a marked-out space 40 feet long by 20 feet wide, divided into 4 courts, 2 at each end, with a centre space, across which a net is fixed, 5 or 5½ feet in height. It is played with shuttlecocks, 5 inches high, and weighing 1 ounce, which are driven by rackets or battledores over the net, backward and forward, until one of the players fails, under certain technical regulations applicable to the game, to return it.

BADMINTON. The estate of the Duke of Beaufort, in Gloucestershire, England. The name was also applied to a drink of sweetened claret, and since the Duke was a supporter of pugilism, it came in sporting circles to signify blood shed in the ring.

BADMINTON, The. A large London club of sporting men, so named in honor of the Duke of Beaufort's estate. It was formed in 1876.

BADOC, bȧ-dōk′. A town of Luzon, Philippines, in the Province of Ilocos Norte. It is situated near the coast, about 22 miles south of Lasag, and has a population of 10,860 (Map: Philippine Islands, E 2).

BADOURA, bȧ-dōō′rȧ. In the story of Prince Camaralzaman in the *Arabian Nights*, the daughter of the King of China, who falls in love with the sleeping prince.

BADRULBUDUR, bȧ-drōōl′bōō-dōōr′. Aladdin's wife in *The Arabian Nights' Entertainments*. She is a beautiful Chinese princess. Despite her love for her husband, she twice nearly causes his undoing by giving away the 'wonderful lamp' in exchange for a prettier one, and by letting two magicians into his house.

BAEDEKER, bĕd′*e*-kĕr, Karl (1801-59). A German publisher, born at Essen. In 1827 he set up a bookshop at Coblenz, and in 1839 published travelers' handbooks for Belgium and Holland. These were succeeded by the *Handbuch für Reisende durch Deutschland und den österreichischen Kaiserstaat* (1842), and by guides to Switzerland (1844), and Paris and environs (1855). Thus was inaugurated this series of world-famous publications. Since 1861, English editions have appeared. The collection now includes almost all European countries, and portions of North America and the Orient, as well as monographs on London, Paris, and Berlin. The volumes are supplied with excellent maps. In 1872 the firm removed to Leipzig, where complete revisions are frequently prepared.

BAEHRENS, bĕr′ens, Emil (1848-88). A German Latinist, born at Bayenthal. He studied classical philology at Bonn and Leipzig, was appointed instructor at Jena in 1873, and professor at Groningen in 1877. His editions of the classics, though often marred by careless haste or bitter attacks on his opponents, are considered valuable because of the use they make of new manuscripts. They include *C. Valerii Flacci Argonauticon* (1875); *Catulli Veronensis Liber* (2 vols., 1876-85); the *Silvæ* of Statius (1876); and *Poetæ Latini Minores* (5 vols., 1879-83); with the additional volume of *Fragmenta Poetarum Romanorum* (1886).

BAEN, or **BAAN,** bän, Jan van (1633-1702). A Dutch portrait painter, born at Haarlem. He studied under Piemans, his uncle, and under Backer. He was invited by Charles II. to come to England, and painted portraits of the King and Queen, and of various members of the English nobility. His style was that of Van Dyck, and his best work is thought to be the portrait of Count Maurice of Nassau (Amsterdam). When he was requested by Louis XIV. to paint his portrait, he replied that he was unable to paint the conqueror of Holland.

BAENA, bä-ā′nȧ (*Baniana*, *Biniana* of the Romans). A town of Spain, in the Province of Cordova, situated about 32 miles southeast of the city of Cordova (Map: Spain, C 4). There are interesting remains of ancient and mediæval times here; of the old Roman town there are a number of relics. The town has stock-raising interests and manufactures of textiles, leather, brick and tiles, lime, etc., and carries on a trade in grain, oil, and wine. Population, in 1887, 12,036; in 1897, 11,994.

BAER, bĕr, Karl Ernst von (1792-1876). A Russian naturalist, born in the Province of Esthonia, Russia. From 1810 to 1814 he studied medicine at the University of Dorpat, and subsequently comparative anatomy with Döllinger at Würzburg, and in 1817 became prosector in the University of Königsberg. He was there appointed professor of zoölogy in 1819, and director of the Anatomical Institute in 1826. In 1829 he became professor of zoölogy and member of the Academy of Sciences at Saint Petersburg, but returned the following year to Königsberg. After 1834 he was prominently identified with the Academy of Saint Petersburg. He was one of the founders of the modern science of embryology, and was among the most influential scientists of his day. Of his numerous works, the most important are *Epistola de Ovi Mammalium et Hominis Genesi* (1827), in which the mammalian egg is described for the first time; *Ueber Entwickelungsgeschichte der Thiere* (1828-37); and *Untersuchungen über die Entwickelung der Fische* (1835). Consult the study by Stieda (Brunswick, 1878).

BA′ER, William Jacob (1860—). An American artist, born in Cincinnati. He studied at the Royal Academy in Munich under Loefftz, and was awarded a first-class medal, and a bronze medal for miniature at the Paris Exposition in 1900. Mr. Baer is probably the first miniature painter in this country. Among his works are the "Madonna with the Auburn Hair," "Daphne," "Nymph," "Summer," and "In Arcadia."

BAERLE, bär′le, Cornelius van. A cultivator of tulips in the story of the elder Dumas, *La tulipe noire*.

BAETHGEN, bĕt′gen, Friedrich (1849—). A German evangelical theologian and Orientalist, born at Lachem. He studied at Göttingen, Kiel, and Berlin, and held professorships at Kiel, Halle, and Greifswald. In 1895 he was appointed professor of Old Testament exegesis and Semitic languages at the University of Berlin. His works include *Untersuchungen über die Psalmen der Peschita* (1878); *Evangelienfragmente* (1885); and *Die Psalmen übersetzt und erklärt* (1892).

BAEYER, bĕ′yẽr, Adolf von (1835—). A distinguished German chemist. He was born at Berlin. After studying chemistry and physics at several German universities, and after teaching for a time at Berlin, he became professor of chemistry at Strassburg in 1872. Since 1875 he has taught at the University of Munich. Professor Baeyer is one of the greatest investigators in the domain of organic chemistry and of stereochemistry. He has effected a very large number of syntheses, and succeeded in preparing new classes of carbon compounds, some of which are not only important from a theoretical point of view, but have also found extensive application in the arts. His process for the artificial preparation of indigo is well known.

BAEYER, Johann Jakob (1794-1885). A German soldier and geologist. He was born at Müggelsheim, Prussia, and educated at Berlin. He served with distinction in the War of Liberation, and in 1821 entered the topographical bureau of the general staff. In 1829 he was intrusted with the task of preparing a triangulation of East Prussia. He became chief surveyor of the general staff in 1843, and in 1852 was promoted to the rank of major-general. His plan for a general survey of Central Europe was accepted by the Prussian Government, and in 1867 the survey was extended to embrace all of Europe. When the Central Bureau of European Surveys was established in 1865 at Berlin, Baeyer was appointed president, and four years afterwards he was elected president of the Geodetic Institute. His numerous important works include *Die Verbindungen der preussischen und russischen Dreiecksketten* (1857); *Ueber die Strahlenbrechung in der Atmosphäre* (1860); *Ueber Die Grösze und Figur der Erde* (1861); and *Das Messen auf der sphäroidischen Erdoberfläche* (1862).

BAEZ, bä′ȧth, BUENAVENTURA (1820-84). A president, for four terms, of the Republic of Santo Domingo. He was the son of a mulatto, inherited a large fortune, and was prominent in securing Dominican independence. He was President of the Republic from 1849 to 1853, when he was driven from the country by Santana. He returned in 1856, was again made President, and in January, 1858, was again driven out, but in 1865 returned once more, and was elected for the third time. The next year an insurrection drove him into exile, and in the following year he was again restored. He strove to have the United States annex the country, but the United States Senate refused to ratify the treaty which he and President Grant had drawn up in 1869 for the purpose.

BAEZA, bä-ā′thȧ. An old town of Spain, in the Province of Jaen, about 22 miles northeast of the capital city (Map: Spain, D 4). It is in a fertile region, the leading products of which are grain, vegetables, oil, and wine, and has manufactures of liquors, soap, and clothing. Population, in 1897, 14,172. Baeza, anciently known as Viatia, was considerably improved by the Gothic kings, and was a flourishing city under the Moors, several of whose caliphs and kings resided here. It was taken from the Moors by Alfonso VII. in 1147, only to change hands several times. In the Thirteenth Century it was sacked by Saint Ferdinand. It was formerly the seat of a university, founded in 1533, and still contains many evidences of its former splendor. The cathedral and the oratory of Saint Philip Neri, with the university, are among its finest buildings.

BAF′FIN, WILLIAM (1584-1622). An English navigator. He accompanied James Hall in his search for a northwestern passage in 1612, and in 1613 commanded the English whaling fleet in the Arctic seas. In 1615 he went north in the *Discovery* under Bylot and explored the inlet now known as Baffin's Bay. He was killed in 1622 while trying, in conjunction with a Persian force, to expel the Portuguese from Ormuz. Baffin was the earliest recorded navigator to attempt to determine longitude at sea by astronomical observation. Consult Markham's edition of the *Voyages of William Baffin* (London, 1881) for the Hakluyt Society.

BAFFIN LAND. A large island west of Greenland, constituting a part of the newly established Canadian District of Franklin. Its area is not accurately known, the west coast not having been as yet thoroughly explored. The east coast is mountainous and glaciated, while the climate is severe, like that of Greenland. A few Eskimos are found along the east coast. The island is named in honor of William Baffin (q.v.).

BAFFIN'S BAY. A gulf, or rather sea, on the northeast coast of North America, extending between that continent and Greenland; latitudes 68° to 78° N., and longitudes 51° to 80° W. (Map: North America, M 2). It is about 800 miles long, with an average breadth of 280. Its greatest depth is 6890 feet. The tides do not rise more than 10 feet. The currents are generally toward the south, though on the east side of Davis's Strait and Baffin's Bay a current from Spitzbergen flows northward round Cape Farewell. The bay is scarcely ever free from ice; during four months of the year navigable channels are clear along the coasts with occasional transverse passages. The shores are for the most part lofty and precipitous, backed by ranges of snow-clad mountains. The prevailing rocks are granite and gneiss. Baffin's Bay communicates with the Atlantic Ocean by Davis's Strait, and with the Arctic Ocean by Smith Sound on the north and Lancaster Sound on the west. Wellington Strait, which forms the northwest outlet of Lancaster Sound, was entered in 1852 by Sir E. Belcher. The south shore of Whale Sound, on the east coast, in latitude 77° 20′ N., was found by Captain Inglefield in 1852 to be inhabited. There are Danish settlements on Disco and Whale islands. The principal animals inhabiting the coasts are, on land, bears, black foxes, and hares; in the sea, the black whale, walrus, and seal, gulls, ducks, and other sea-fowls. Whale and seal fishing are prosecuted to a large extent. Baffin's Bay was first explored in 1615 by William Baffin, after whom it was called, and who was pilot of the expedition, which was commanded by Bylot. Baffin's title to this honor seems to have been most faithfully earned; and the accuracy of his observations and descriptions has been confirmed by subsequent navigators.

BAFFO, bäf′fō. See PAPHO.

BA-FYOT, bä′fē-ōt′, or **BA-FIOT.** A Bantu tribe (also called Cabinda) living between the Lower Kuilu and the Congo estuary. They are industrious and skillful, good boat-builders, and reputed the best craftsmen on the Western African coast. They have profited by contact with Europeans more than other tribes in this region, but still burn witches and combine paganism and Christianity in their religion.

BAGAMOYO, bä′gȧ-mō′yō. A seaport town of German East Africa, situated a short distance northwest of Dar-es-Salaam (Map: Congo Free State, G 4). It has a few stone houses; but the natives, who constitute the bulk of its population, live mostly in huts. There are a customhouse, a post-office, and a park, with a monument to the troops who fell during the uprising of the natives in 1889. The town is connected by cable with Dar-es-Salaam and Zanzibar. Its roadstead is accessible for small boats. The population is about 18,000, and includes only a few Europeans. Consult Dietert, "Bagamoyo und Handel und Wandel in Deutsch-Ostafrika," in Jahrg. 2, *Beiträge zur Kolonialpolitik und Kolonialwirtschaft* (Berlin, 1901).

BAGARA, bȧ-gä′rȧ. A tribe of pastoral Arabs in the Egyptian Sudan, on the White Nile, above Khartum.

BAGASSE, bȧ-găs′ (Fr. dialectic byform of *bagage*, baggage, lumber), CANE-STRAW, or CANE-TRASH. The refuse matter left after the extraction of the saccharine juice from the sugar-cane. The only use to which the bagasse is put is as fuel in the heating of the boilers and pans in the sugar manufactory. See SUGAR; FUEL.

BAGATELLE, băg′ȧ-tĕl′ (Fr., It. *bagattella*, dim. of *bagata*, trifle, from Low Lat. *baga*, bundle; cf. bag, baggage). A game somewhat akin to billiards, inasmuch as it is played with cues and balls upon a cushion-rimmed table. The table, which is usually about 7 feet long and 38 inches wide, has a group of 9 holes, arranged and numbered as follows:

5
3 2
8 9 7
4 6
1

It is played with 9 balls, 8 of which are white, and 1 red (or black). This (the king-ball) is placed on a spot in front of hole 1, and the player strikes a ball at it from the balk-line at the end of the table, and endeavors to put it, his own, or both balls into hole or holes. Whatever hole the king-ball falls into counts double. The remainder of the balls are driven, one by one, up the table in like manner, and the sum total of the holes they drop into is the player's score.

In 'Mississippi' a bridge with arches is placed in front of the first hole, and through these arches the ball must pass before it can reach the holes beyond.

BAGAU′DÆ. Peasants of Gaul who resisted Roman oppression, about A.D. 270, capturing and destroying Augustdunum (now Autun). Claudius II. temporarily repressed them, but Aurelian made concessions to them and proclaimed general amnesty. They rose again in 294, and Maximian was sent against them. Their first leader was Victoria; subsequently there were two, Ælianus and Amandus, the latter calling himself emperor. The two last named fell in battle, and Maximian utterly defeated their forces; but they were troublesome to Rome until the end of the Western Empire.

BAG′BY, GEORGE WILLIAM (1828-83). An American humorist. He was educated at Delaware College, and afterwards had a medical course at the University of Pennsylvania. He then took up editorial work, especially on the *Southern Literary Messenger*, from 1859 till near the close of the war. Subsequently he was made State Librarian, and became widely known as a lecturer and humorist, writing over the name 'Mozis Addums.' He deserves to be remembered as having kept up the old school of Southern humor, founded by Longstreet and Hooper. His works were collected in 3 vols. (Richmond, 1884-86).

BAGDAD, băg-däd′ *or* (as Anglicized) băg′-dăd. A vilayet of Asiatic Turkey, situated near the southeastern end of the country, and covering an area of 54,503 square miles (Map: Turkey in Asia, L 6). It is watered by the Tigris and Euphrates, but the soil, with the exception of a small portion, is barren and unproductive. The population is variously estimated at from 600,000 to 850,000, consisting of Turks, Arabs, Armenians, Jews, and Kurds.

BAGDAD (Ar. and Turk. *bagh*, garden + *Dad*, a monk whose cell was near the city; or Pers. *Bag*, Russ. *Bog*, God + *dad*, Lat. *datus*, given). The capital of the Turkish vilayet of the same name, and formerly one of the most magnificent cities of the Mohammedan world, situated in the centre of the vilayet on both sides of the Tigris (Map: Turkey in Asia, L 6). The modern and larger portion of the city lies on the eastern bank and is connected with the old town on the opposite side by two pontoon bridges, 650 and 715 feet long respectively. Bagdad is surrounded by a brick wall, partly ruined, and a dry moat, and has an attractive appearance from the river. Upon closer examination, however, it proves to be a very ill built and neglected city, with but few remnants of its former splendor here and there, and on the whole possessing but few attractions. The streets are crooked, narrow, and filthy, as only streets in the Orient can be. The houses are low, and the absence of windows in the front renders them exceedingly sombre and uninviting. The interior, however, is here and there richly decorated, and the courts are sometimes ornamented with artistic fountains. Bagdad contains a large number of mosques (most of them ruined), which alone testify to its former splendor. Among other public buildings the most noteworthy are the Governor-General's palace, the citadel, and the numerous *khans*. Bagdad also contains a number of brick-covered bazaars, which have long been famous. In the vicinity are situated a number of tombs held in high reverence by the natives and visited annually by thousands of pilgrims. In olden times Bagdad was famous as a seat of learning and culture, but at present its high schools or *medressen* are very few in number, and its importance is due chiefly to its commerce. Before the opening of the Suez Canal, Bagdad was an important centre on the trade route from India to Europe. At present the traffic from India is on the decline, but Bagdad is still a place of importance in the trade of the Orient, the mart through which pass the imports and exports of Mesopotamia, and an outlet for the products of Arabia and Persia intended for the Eastern markets. Transportation is effected from Basra to Bagdad by the Tigris, and from there to Constantinople, Aleppo, and Damascus by caravans. The construction of the projected German railway, which is to connect Bagdad with Konieh, in Asia Minor, promises a revival of the former commercial importance of the city. The chief articles of export are wool, fruits, horses, various Oriental fabrics, skins, gum tragacanth, feathers, dates, and leather articles. Bagdad is the seat of a United States consulate. The population has been repeatedly decimated by pestilence and inundations. At present it is estimated at 150,000. It consists of Arabs, Turks, Jews, Persians, Kurds, Armenians, Syrians, and some Hindus. The number of Christians is insignificant, and the Mohammedans are about equally divided between Sunnites and Shiites.

Bagdad was built by the Abbasside Caliph Almansur (A.D. 762-66), out of the ruins of Ctesiphon and Seleucia. Soon after it was greatly enlarged by Harun-al-Rashid, under whose immediate successors it attained to that magnificent prosperity which finds its reflex in the pages of the *Arabian Nights*. In 1258 the grandson of

Genghis Khan, Hulaku, put an end to the Abbasside Caliphate; but the descendants of the Tartar conqueror were expelled by Timur, who took the city in 1393. In the beginning of the Sixteenth Century, Shah Ismail, the founder of the Sofi dynasty in Persia, made himself master of it. Turks and Persians strove for its possession until Amurath IV., in 1638, definitely annexed it to the Ottoman Empire, which has since retained it. Consult Le Strange, "Baghdad during the Abbasid Caliphate," in *Royal Asiatic Society Journal* (London, 1899).

BAGDAD. The port of Matamoros (q.v.), Mexico. It is situated at the mouth of the Rio Grande del Norte, in the Gulf of Mexico, but its harbor is not navigable for large vessels. During the Civil War it was an important trading-place for the Confederates, who had to run the blockade of the Federal ships.

BAGE, Robert (1728-1801). An English novelist. He was born at Darley, Derbyshire, February 29, 1728. At the age of 23 he settled at Elford, near Tamworth, where he engaged in the manufacture of paper till his death, September 1, 1801. The prevailing French social theories he embodied in several novels of considerable interest, as *Mount Henneth* (1781); *Barham Downs* (1784); and *Hermsprong* (1796). Consult Ballantyne, *Novelists' Library*, edited by W. Scott (London, 1821-24).

BAGEHOT, băj'ot, Walter (1826-77). An English economist and publicist. He was born at Langport, Somersetshire, February 23, 1826, and was educated at University College, London, where he won distinction by his work in mathematics and in intellectual and moral philosophy and political economy. He began to read law, but never practiced the profession. After a stay of some months in Paris in 1851, where he lived through the coup d'état of December, he returned to England to take part in his father's ship-owning and banking business. In 1858 he married the eldest daughter of the Right Hon. James Wilson, founder of the *Economist*, which had been established during the Corn-Law agitation to advocate free-trade principles. In 1860, on the departure of his father-in-law for India, Bagehot became the editor of the *Economist* and retained that position until his death in 1877.

Bagehot's principal works, which were widely translated and passed through several editions, were: *The English Constitution* (1867); *Physics and Politics* (1872); and *Lombard Street* (1873). The first work, which has been widely used in England and the United States as a textbook, is a keen analysis of the English system of government. It is striking in its distinction between the 'ornamental or theatrical' part and the practical parts, the Crown and the House of Lords constituting the first, the House of Commons and the Cabinet the second. The vigor of his language would imply that the theatrical parts were useless; but, on the contrary, Bagehot holds them in high honor, despite proposals for reforming the House of Lords. They seem to assure confidence in the stability of government, and inculcate a respect for superiority and tradition which is the saving grace of English democracy. In his discussion of the practical parts he brings out strongly the essence of parliamentary government in the blending of executive and legislative authority in the Cabinet. He was among the first to point out the excellences of the cabinet system. His work, *Physics and Politics*, expands the thesis that rule and tradition, awakening the spirit of coöperation, is the keynote of political progress. Without this habit of pulling together, nations of brilliant intellectual parts have failed to maintain themselves.

His *Lombard Street*, which is a description of the rôle that the Bank of England plays in the English financial system, lies in quite another field of thought, for which, however, his training as vice-chairman of the Langport Bank and his position as editor of England's financial organ gave him special facilities of knowledge. The work is a masterly analysis of the English credit system, and its lucidity of statement has gained for it a wide reading and a permanent place in the literature of political economy.

Bagehot was a man of great versatility, whose reputation as one of the best conversationalists of his day will more readily be understood by those who read his *Literary Studies* and *Biographical Studies*, republished after his death in his collected writings, in which his vivacity and humor find greater scope than in the larger works already noted. For a memoir of Bagehot consult the prefatory notice to *Literary Studies*, edited by R. H. Hutton (London, 1879).

BAG'GAGE (Fr. *bagage*, from OF. *bague*, bundle, pack). In the law of common carriers all such articles of a traveler as are incidental to the journey or required by him during the journey. Thus, personal jewelry and a reasonable amount of money for expenses, as well as wearing apparel, etc., are baggage; but jewelry and goods intended for sale, articles of furniture, etc., are not. The significance of the distinction lies in the fact that the extraordinary liability of the common carrier extends to the baggage of a passenger, and yet, as a carrier of passengers, he is exempt from that liability for goods not coming under the description of baggage. The carrier, however, is liable for damage resulting from his gross negligence, even if the articles shipped or carried by the passenger are not baggage; and his acceptance of them, knowing their character, may put upon him the full liability of a common carrier. See Carrier, Common.

BAGGAGE, Military. The impedimenta of an army, including all articles of stores necessary, or pertaining to, a body of men moving from one point to another. Ammunition and food supplies, while coming under this general heading, take precedence of all other baggage, on account of their imperative necessity to the existence of troops in the field. In all armies, strict rules are enforced, regulating the amount and description of baggage that may be carried for officers and soldiers at home and abroad, both in time of peace and during war. In the field, though a soldier in the ranks carries his whole kit, yet a certain proportion of wagons are allotted to his command for the heavier baggage —tents, cooking utensils, ammunition, etc. The question of baggage is one of the most difficult problems a commander in the field has to deal with. In the United States the transportation of baggage is covered by Sec. 1242, *United States Army Regulations*, which provides that the baggage to be transported at public expense, including mess-chests and personal baggage, upon change of station, shall not exceed the following weights:

Rank	In the Field, Pounds	Changing Station, Pounds
Major-General	1,000	3,500
Brigadier-General	700	2,800
Field Officer	500	2,400
Captain	200	2,000
First Lieutenant	150	1,700
Second Lieut. and Veterinarian	150	1,500
Acting Assistant Surgeon	150	1,200
Post and Regimental non-commissioned Staff Officer, Hospital Steward, Chief Musician, Sergeant of the Signal Corps, Squadron and Battalion Sergeant Majors, each	....	500

For officers and others in the above list, when embarking under orders for extended service over the sea and for duty in Alaska, and upon change of station in Alaska, and in places beyond the limits of the States composing the Union, as well as upon return to said States, the allowance of baggage to be transported by the Quartermaster's Department from initial point to point of embarkation, and from port of destination to garrison station, will be three times the allowance prescribed above for change of station.

BAGGESEN, bäg′ge-sen, Jens (1764-1826). A Danish poet, born at Korsör, who in his early works represented Eighteenth-Century culture and afterwards became a representative of a restrained romanticism. His first poems were *Comic Tales* (1785), followed by satires, epistles, and elegies, produced with restless haste, in which, however, he showed himself a conservative champion of form against the innovation of the romanticists, and won the title, 'poet of the graces.' Under the patronage of the Duke of Augustenburg he traveled widely, was for a time director of the National Theatre in Copenhagen, and in 1800 went to Paris. In 1811 he became professor at Kiel, and later returned to Copenhagen to find his fame eclipsed by that of the romantic Oehlenschläger (q.v.), who at first commanded his sincere admiration, but later evoked his bitter criticism. He left the field, defeated, for a voluntary exile at Hamburg, in 1820. The *Labyrinth* (2 vols., 1792-93), his most important work, is a graceful impressionist's description of his journeys. He wrote also in German, and left a vast and entertaining *Correspondence*. Though now little read, and never genuinely popular, his work exercised in its time a great influence upon the literary public. Consult: Arentzen, *Baggesen og Oehlenschläger* (Copenhagen, 1870-78); Clausen, *Jens Baggesen* (ib., 1895).

BAGHELKHAND, bä′gel-kŭnd′ (Ar., Turk. *bagh*, garden + *el*, the + *khand*, hill). A British agency of Central India, situated between latitudes 22° 40′ and 25° 10′ N. and longitudes 80° 25′ and 82° 45′ E. It comprises the five Native States of Rewah, Nagode, Maihar, Sohawal, and Kothi. Area, 11,300 square miles. Population, in 1891, 1,737,606 in 1901, 1,554,577.

BAGHERIA, bä′gȧ-rē′ȧ, or **BAGARIA**, bä′gȧ-rē′ȧ. A city in Sicily, 8 miles southeast of Palermo. The surrounding plains are splendidly fertile, and the town contains many villas of Palermo grandees, among them the Villa Palagonia, celebrated by Goethe, and the Villa Valguarnera, which has one of the most beautiful prospects in Sicily. Population, in 1881 (commune), 14,000; in 1901, 18,218.

BAGHIRMI, bȧ-gēr′mē. See Bagirmi.

BAGIMONT'S (băj′ĭ-mŏnts), or **BAGAMUND'S** (băg′ȧ-mŭndz) **ROLL**. The name given, from the end of the Thirteenth Century till the Reformation, to a valuation, according to which the ecclesiastical benefices of Scotland were taxed. It took its name from an Italian churchman, Boiamund de Vesci, who was sent from Rome in 1275 to collect the tithes from all the Church livings in Scotland for an expedition to the Holy Land, as decreed by the Second Council of Lyons (1274). Hitherto the Scotch clergy had been taxed according to a conventional valuation, called the *antiqua taxatio;* but Boiamund set this aside, and, in spite of their opposition, assessed the benefices at their actual yearly worth, or *versus valor.* Consult *Archæologia*, Vol. XVII. (London, 1813).

BAGINSKY, bȧ-gēn′skĭ, Adolf (1843—). A German physician. He was born at Ratibor, and studied at Berlin and Vienna. In 1890 he was appointed director of the hospital known as the *Kaiser-und Kaiserin-Friedrich Krankenhaus*, in Berlin, an institution devoted chiefly to the cure of the infectious diseases of children. He was private lecturer on children's diseases at the University of Berlin from 1881 to 1892, and in 1892 was appointed extraordinary professor at that institution. He founded and became coeditor of the *Archiv für Kinderheilkunde*, established in 1880. His principal works include: *Handbuch der Schulhygiene* (2d ed., 1883); *Lehrbuch der Kinderkrankheiten* (4th ed., 1892); *Pflege des gesunden und kranken Kindes* (3d ed., 1885); *Das Leben des Weibes* (3d ed., 1885). All these books are widely known.

BAGIRMI, bȧ-gēr′mē, or **BAGHIRMI**. A tributary State of Wadai, French Congo (q.v.), north-central Africa, situated between Wadai and the northern part of Kamerun (q.v.), to the southeast of Lake Chad (Map: Africa, F 3). Its area is estimated at from 50,000 to 60,000 square miles. The population is estimated at over 1,000,000, and consists of different races, including Fulahs and Arabs. The principal occupation is agriculture, but there are also some manufactures of textiles and leather. The form of government is absolute, and an armed force, estimated at over 10,000, is maintained. The prevailing religion is Islam, which was introduced in the Sixteenth Century. Since the agreement of 1896 between France and Germany, Bagirmi has been recognized as belonging to the French sphere of influence. In the following year, after the signing of a separate treaty between the French Government and the Sultan of Bagirmi, a French resident was appointed at Massenya, the capital. At the end of 1899, Rabah, a usurper of Bornu, invaded the state, but was speedily defeated by the French troops.

BAGLIONI, bȧ-lyō′nē. A family of Florentine Renaissance architects, sculptors, and wood inlayers of the Fifteenth and Sixteenth centuries. The founder was Baccio d'Agnolo Baglioni (1462-1543), of whose four sons, all artists, two became prominent, Domenico (born

1511) and Giuliano (1491-1555), who followed their father's style. Baccio d'Agnolo, while not a genius, showed real talent in the treatment of palace architecture of moderate size in Florence. He continued the manner of Pollaiuolo (q.v.), whom he had assisted in building the great hall of the Palazzo Vecchio. While not modifying Pollaiuolo's style of exterior, he gave greater elegance and simplicity to the palace courts. Such were the Taddei and Ginori palaces. He showed considerable originality in the Bartolini Palace (1520), and in a couple of villas (Bartolini and Borgherini). The best work of Domenico is the Buturlin Palace.

BAGLIONI, Cavaliere Giovanni, called Il Sordo del Barozzo (1571-1644). An Italian painter and art historian, born in Rome. He was a pupil of Francesco Morelli, and was a favorite of the Popes Sixtus V., Clement VIII., and Paul V., for whom he painted many fine frescoes in San Giovanni Laterano, Saint Peter's, and the Vatican. His most important literary work is *Le vite de' pittori, scultori, architetti, ed intagliatori dal pontificato di Gregorio XIII., fino ai tempi di Urbano VIII.* (Rome, 1642; Naples, 1733).

BAGLIVI, bȧ-lyē'vė, Giorgio (1669-1707). A celebrated Italian physician of the Iatro-Physical School (see Borelli); descended from a poor Armenian family. In 1692 he went to Rome, where he attended the lectures on anatomy given by Malpighi. Soon afterwards he was appointed professor of anatomy at the Collegio di Sapienza, Rome. He was the first to propound the doctrine of 'solidism' in medicine, according to which the primary seat of disease is in the solid parts of the organism and not in the fluids, as had been universally maintained previous to his time. His complete works were published under the title *Opera Omnia Medica Practica et Anatomica* (Lyons, 1704).

BAGNACAVALLO, bä'nyȧ-kȧ-väl'lō, Bartolommeo da (1484-1542). An Italian painter, whose real name was Ramenghi, but who was called Bagnacavallo from his native village. He was a pupil of Francesco Francia, and also studied with Raphael in Rome, where he worked on the decorations of the gallery in the Vatican. At Bologna he took the leading place, and did much to improve the style of the Bolognese School. His works are distinguished by rich coloring and graceful delineation. The best specimens, the "Disputation of Saint Augustin," and a "Madonna and Child," are at Bologna, where he died.

BAGNÈRES-DE-BIGORRE, bȧ'nyâr' de bē'gôr' (Fr., baths of the Bigerrones; see below). A town and watering-place situated amid lovely scenery in the Department of the Hautes-Pyrénées, France (Map: France, G 8). At Bagnères there are 30 mineral springs of varied temperature and chemical composition, each of which is described as a specific for different diseases. There are 10 bathing establishments, and the place is visited annually by 20,000 invalids and tourists. Population, in 1896, 6900. The place was well known to the ancient Romans, who called it Vicus Aquensis, or Aquæ Bigerrionum, and erected there many baths and a temple of Diana.

BAGNÈRES-DE-LUCHON, lụ'shôɴ'. A watering-place in the Department of Haute-Garonne, France (Map: France, G 9). It is divided into an old and a new town; the latter, with its villas and gardens, fine streets and promenades, being five times as large as the cluster of mean and narrow streets which forms the old town. Bagnères-de-Luchon has 48 springs, which vary in their composition and their temperature. About 36,000 strangers annually resort to these springs. Population, in 1896, 3700. The Romans gave it the name Thermæ Lixonienses, but for many centuries, even throughout the Middle Ages, the place was deserted. Heyret d'Etigny, whose statue stands in the town, caused the waters to be analyzed in 1751, and drew attention to their medicinal properties, but the popularity of the place dates only from the beginning of the Nineteenth Century.

BAGNES, bån'y', or **BAGNE,** Val de. A picturesque valley in the Canton of Valais, Switzerland, watered by the Dranse, a tributary of the Rhône. It is encircled by mountains, of which the highest are the Grand Combin, 14,164 feet, and Mont Gelé, 11,000 feet. Glaciers are found in the valley, the largest being the Corbassière and the Giétros. Waterfalls and gorges abound along the course of the river, and its current is very swift. It has frequently overflowed and inundated the valley, notably in 1818, when, dammed by the Giétros Glacier, it broke through and swept away 500 dwellings, drowning a number of people. The chief town of the valley, Chable, is sometimes called Bagnes.

BAGNES. The convict prisons of France. Serious crimes in France were, till 1748, punished by terms of service in the galleys. In that year these were abolished, and the convicts were employed in hard labor in arsenals and other public works, and the prisons in which they were lodged were called *bagnes*, from the Italian *bagno*, literally a bath—a name supposed to have originated in the fact that the slave-prisons at Constantinople contained baths, or because they stood near the baths of the seraglio. The Legislative Assembly of 1791 and 1792 mitigated the sufferings of the convicts, and substituted, for the detested name *galères*, that of *travaux publics*, to which succeeded the *travaux forcés* of the Code Napoléon. The practice of branding criminals with a hot iron was not abolished until 1832. The latest existing institutions of this class were at Toulon, Brest, and Rochefort. The discipline of the bagnes was cruel. Men were always chained in couples, and released only after the most exemplary behavior. Their food was miserable, and they were herded together at night like cattle. The labor of the convicts was turned to profitable account, and the various handicrafts were taught in the prison under the direction of overseers. The industrious and clever were enabled to earn small wages. Formerly the punishment of the galleys was inflicted for comparatively slight offenses, such as removing landmarks, begging, poaching; but hard labor in the bagnes was reserved exclusively for such as committed crimes which seriously menaced the public peace and personal safety. These prisons were abolished in 1852, and the convicts were gradually drafted off to French Guiana and New Caledonia. Toulon Prison was not emptied till 1870. To readers of Victor Hugo's *Les misérables* the bagnes are of course familiar as the home, during many years, of the hero, Jean Val-jean. Consult Zaccone, *Histoire des bagnes* (Paris, 1875).

BAG′NET, Mr. and Mrs. Joe. A gallant ex-artilleryman and his wife in Dickens's *Bleak House.* They have three children, all named after the towns at which they were born, Malta, Quebec, and Woolwich.

BAGNI-DI-LUCCA, bä′nyė dê lụk′kȧ (It., Baths of Lucca). A spa much frequented in the summer, in North Italy, 13 miles northeast of Lucca (Map: Italy, E 3). There are hot springs of various temperatures from 96° to 133° F. scattered over a limited neighborhood. It consists of several villages in the cool and shady Valley of the Lima. The springs number 100, and were known in the Middle Ages as the Baths of Corsena. Population, in 1881, 9205; in 1901, 12,150.

BAG′NIGGE WELLS. A London picnic-ground in the reign of George II., situated on Gray's Inn Road, across from the present Mecklenburg Square. It was elaborately laid out with promenades, flower-beds, and shrubbery, and contained a large single-roomed hall for entertainments of various kinds. It originally consisted of certain baths, founded in 1708 as a rival of of Baine's cold-bath establishment.

BAGOBO, bȧ-gō′bō. A wild Malay people living in Dávas Province, Mindanao. Their speech is a distinct dialect. See PHILIPPINES.

BAG′OT, Sir CHARLES (1781-1843). An English diplomatist. He became under-secretary of state in 1807; special envoy to France in 1814; minister plenipotentiary to the United States in 1819; ambassador to Russia in 1820, and to Holland in 1824, and special ambassador to Austria in 1834. He was appointed Governor-General of Canada in 1842, and died in office.

BAG′PIPE. A wind instrument, which, up to the Eighteenth Century, was common in almost every country in Europe, and still continues in use among the country people in Poland, Italy, Sicily, the south of France, Scotland, etc. It consists of a leather bag, which the player inflates by blowing with his mouth through a tube, as among the Scotch Highlanders, or by means of a small bellows. The music proceeds from three or four pipes, whose mouthpieces are inserted into the bag; the wind being forced out by pressing the bag under the arm. One of the pipes, the *chanter*, is a primitive oboe with eight holes; the others, called *drones*, sound each only one continuous low note. It is certain that the bagpipe was in use among the Hebrews and Greeks, and there is enough evidence that in Germany and elsewhere in Europe it was among the most favorite instruments in the Fifteenth Century.

Though fallen generally into disuse, with the growth of musical refinement, the bagpipe is still a popular instrument in the Highlands of Scotland, and at gatherings of Highlanders, and even of Lowland Scotch, in America and other countries. Pipers in proper costume are also attached to the Highland regiments in England, and in some instances pipers are retained by Scottish noblemen to play on festive occasions. Skill in playing the bagpipe is promoted by various Highland societies, which, at periodical competitions, give prizes to the best players of pibrochs (q.v.), reels, and other airs.

BAG′RADAS. An eastern Algerian river, now called Medjerda. Its length is about 200 miles, and it opens into the Gulf of Tunis.

BAGRATIDES, băg′rȧ-tīdz, or **PAGRATIDES,** păg′rȧ-tīdz. A noble family of Armenia, descended from the ancient Jews, and converted to Christianity about the close of the Third Century. In 743 they were made hereditary governors of Armenia by the Caliphs, and in 885 the first king of the line was crowned. The dynasty was extinguished in 1079 by the Byzantines. A line of Bagratides long ruled in Georgia.

BAGRATION, bȧ-grä′tē-ôn′, PETER IVANOVITCH, Prince (1765-1812). A distinguished Russian general, descended from the noble family of the Bagratides of Georgia. He entered the Russian service in 1782, and was trained under Suvaroff. In 1788 he was engaged at the storming of Oczakov, fought in 1792 and 1794 against the Poles, in 1799 in Italy and Switzerland, and distinguished himself in the Austro-Russian War of 1805 against the French, especially in the sanguinary engagement of November 16 of that year at Hollabrun, when, with a small body of troops, he bravely stood during six hours opposed to the superior forces under Murat, and thus enabled the Russian general, Kutusoff, to reach Znaim with the main army. Subsequently, Prince Bagration was engaged in the battles of Austerlitz, Eylau, Heilsberg, and Friedland, and took part in the Russian campaign against the Turks, being defeated in the battle of Tartaritza, 1809. In the campaign of 1812 he commanded the Second Russian Army of the West, and had the misfortune to fail in his attack on Davout, near Mohilev, but succeeded in forming a junction with the First Army of Smolensk. He was mortally wounded in the battle of Borodino, and died on October 7.

BAG′SHOT BEDS (found in Bagshot Heath in Surrey). A series of sands belonging to the Middle and Upper Eocene of Great Britain. They rest on the true London clay, but their best development is on the Isle of Wight, where a thickness of at least 660 feet is recorded. Certain beds of the series are rich in reptilian and fish remains, as well as in those of mollusks.

BAGSHOT HEATH. A level stretch of country near the English counties of Surrey and Berkshire, once the place of many a highway robbery, and now used for military manœuvres.

BAG′STOCK, MAJOR JOE. A character in Dickens's *Dombey and Son.* He is fat, purple-cheeked, martial of speech, and apoplectic. He dines with amazing frequency and heartiness at Mr. Dombey's during that worthy's palmy days; but after the failure of Dombey and Son he severs the acquaintance in words of injured dignity. He lives opposite Miss Tox, and is not without an interest in her matrimonial prospects.

BAG′WORM′, or **BAS′KETWORM′.** The caterpillar of a moth (*Thyridopteryx ephemeræformis*) common throughout the northern United States, which spins a silken bag as a protection, and moves about with it, head downward. It is enlarged as the larva grows, and at last is fastened to a tree-branch at one end; within this the caterpillar transforms to pupa, and there the wingless female lays her eggs. The male is a fully winged moth, with dark body and light-colored wings. They sometimes swarm in city parks and similar situations, and defoliate shade trees over a large area, unless the cocoons are scraped off and destroyed. Compare FAGGOTWORM.

BAHADUR, bȧ-hạ'dōōr, SHAH (c.1767-1862). The seventeenth and last Great Mogul of the House of Tamerlane. When he was 90 years old, the Mohammedans of Hindustan made him leader of the movement to reëstablish the Mogul Empire. He took refuge in the tomb of his ancestors when Delhi was captured by the British, but was taken prisoner and banished to Rangoon. He wrote a large number of songs, which were published under the title of *Safar* (Victory), and was regarded as the most gifted of the modern poets of Delhi.

BAHALUL, bä'hȧ-lōōl'. A character in *The Arabian Nights*. He is nicknamed 'The Crazy,' and is a fool of Harun-al-Rashid's court.

BAHA'MAS, or LUCAYOS. A group of islands, forming a division of the British West Indies, situated in the Atlantic Ocean, between latitudes 21° and 27° 31′ N., southeast of Florida and north of Cuba and Haiti (Map: West Indies, K 2). Including the reefs, they number over 3000, of which only about 20 are inhabited. The principal islands are New Providence, Abaco, Harbor Island, Great Bahama, Andros Island, San Salvador, Long Island, Mayaguana, Eleuthera, Exuma, Watling's Island, Acklin's Island, Crooked Island, and Great Inagua. The total area of the group is placed at 5450 square miles. The islands are long and narrow, with a generally low surface, the highest point attaining to an altitude of a little above 225 feet; they are comparatively fertile, though the soil is not of great depth. Some of the larger islands have a valuable growth of timber. Cotton and sisal are cultivated to a considerable extent, and other leading products are maize, pineapples, oranges, grapes, etc. Fishing for sponges and other marine products is one of the most important occupations. The climate, although moist, is not unhealthful for whites, though among the negroes there is a high rate of mortality from pulmonary complaints. The mild winter temperature has made the islands, particularly New Providence (the most important, with an area of 85 square miles), a popular place of winter and health resort.

The imports into the Bahamas in 1900, principally textiles and flour, amounted to £335,269 ($1,676,345), while the exports were valued at £207,223 ($1,036,115). The principal articles of export are sponges, pineapples, fibre, turtle shell, etc.

The islands are administered by a governor, assisted by executive and legislative councils of nine members each, and a representative assembly of 29 members, elected on a property qualification. Education is subsidized to a considerable extent by the Government. The revenue and expenditures of the colony for 1900 were £78,860 ($394,300) and £82,837 ($414,185) respectively. The capital, Nassau (q.v.), on New Providence, is the seat of a United States consul. Total population of the Bahamas in 1891, 47,565; in 1901, 53,735.

The Bahamas were discovered by Columbus in 1492, though the exact locality of his first landing has been the subject of considerable dispute. The English, in 1629, established a settlement on New Providence, from which they were driven by the Spanish in 1641, and from that time until 1783, when they were ultimately acquired by England, they were alternately in the possession of the Spanish and the British. At this period, the islands became notorious as the rendezvous of pirates and the scene of disorder and lawlessness. During the Revolution, the Bahamas gave refuge to a number of American Tories, whose wealth and slave-labor aided materially in the development of the islands. The blockade of the Southern ports during the Civil War made Nassau the chief station in the blockade-running trade, and increased the commerce of the islands to an enormous extent. The Bahamas have suffered severely from hurricanes, notably in 1866 and in 1883, and disastrous droughts have occurred. In 1848 the Turk and Caicos Islands were joined to Jamaica for administrative purposes. Consult: *British Empire Series* (London, 1900); Stark, *History and Guide to the Bahamas* (Boston, 1891). For further references, see WEST INDIES.

BAHAR, bȧ-här'. See BEHAR.

BAHAWALPUR, bȧ-hä'wȧl-pōōr', or **BHAWALPUR,** b'hä'wȧl-pōōr'. One of the Native States of the Punjab, India, in latitudes 27° 41′ to 30° 25′ N., and longitudes 69° 30′ to 73° 58′ E., with an area of 17,285 square miles (Map: India, B 3). Population, in 1891, 650,000; in 1901, 720,700. The country is remarkably level, but only about one-sixth is capable of cultivation, the fertile portion skirting the Ghara and the Indus. Beasts of chase, such as tigers and boars, abound; domestic animals, camels, kine, buffaloes, goats, and broad-tailed sheep, are raised. The principal exports are cotton, sugar, indigo, hides, drugs, dyestuffs, wool, butter, and provisions in general. The principal imports are the wares of Britain. Bahawalpur is traversed by the Indus Valley Railway.

BAHAWALPUR, or **BHAWALPUR** (*Bhawal* Khan, name of a ruler + Skt. *pur*, city). The capital of the Native State of the same name, India, on a tributary of the Ghara, in latitude 29° 24′ N. (Map: India, B 3). It has a circuit of 4 miles—part, however, of the inclosed space being occupied by groves of trees. Bahawalpur has manufactures of scarfs and turbans, chintzes, and other cottons, and the immediate neighborhood is remarkably fertile in grain, sugar, indigo, tobacco, and butter, with an abundance of mangoes, oranges, apples, and other fruits in perfection. For external commerce Bahawalpur is favorably placed. It has railway connection with Multan (q.v.) and stands at the junction of three routes respectively from the east, southeast, and south; while, toward the north, the Hindu merchants, who are very enterprising, have dealings with Bokhara, and even with Astrakhan. Population, about 14,000.

BAHIA, bä-ē'ȧ (Sp. and Portug., bay), or São Salvador de la Bahía de Todos os Santos. Capital of the State of Bahía, Brazil, the second city of the country, and the seat of an archbishop, who is Primate of Brazil (Map: Brazil, K 6). It is situated on the east shore of the Bahia de Todos os Santos, or Bay of All Saints, from which it takes its name. It is 440 miles southwest of Pernambuco, and 800 miles northeast of Rio Janeiro, with both of which cities it has communication by steamship and telegraphic cables. The city is divided into the *cicade baixa*, or lower city, and the *cicade alta*, or upper city. The former is the business quarter, with narrow, close, and dirty streets, while the upper city is clean and cool and commands a magnificent view. Hydraulic elevators connect the two parts of the city, and passenger traffic is also effected between them by means of *cadeiras*, or sedan chairs, the streets being so steep that carriages in many places cannot pass along them. The upper section is pleasantly surrounded by gardens of orange and banana trees, and contains some fine buildings, notably the cathedral and the palace of the archbishop. The former edifice, the finest basilica in Brazil, constructed from marble brought from Europe, was the Church of the Jesuits. The principal educational institutions are the university, normal school, medical college, museum, and a public library of several thousand volumes. Electric street railways traverse the city and suburbs, and Bahia is the starting-point and terminus of a railway to the interior. The harbor, protected by the natural breakwater formed by the island of Itaparica, is excellent. It has a circumference of more than 112 miles, and is everywhere deep enough for the largest vessels, which, however, cannot unload at the quays, because of the heavy ground swell from the open sea. The ocean liners of the chief maritime powers of the world are represented in the shipping trade of Bahia. The bay and city are defended by an extensive system of fortifications, making it the most strongly protected town in Brazil. Of these defenses the best is the Fort do Mar, or Sea Fort, perched on an artificially enlarged rocky islet in the middle of the harbor.

The city has numerous industries. For about fifty years, Bahia has been the largest producer of cotton cloth, and also the supply base of northern Brazil for shoes, boots, and hats. It exports sugar, cotton, coffee, hides, dyewoods, jute-wares, and tobacco—its snuff having a widespread reputation. Customs restrictions prevent the full expansion of its trade. Bahia is the seat of a United States consul. It is the oldest city in Brazil; Amerigo Vespucci first entered its bay in 1503; from its foundation, in 1510, by the Portuguese navigator Correa, till 1763, it was the capital of the country. It fell into the hands of Holland in 1624, but not long after was regained by Portugal, remaining in her possession till 1824, more than a year after the proclamation of independence in the rest of Brazil. Population, in 1890, 174,412.

BAHIA. An eastern State of Brazil, bounded by the States of Pernambuco and Piauhy on the north, Goyaz on the west, Minas Geraes on the south, and the Atlantic Ocean on the east. It has an area of 164,649 square miles. The slightly indented coast is well wooded, and is the most fertile part of the State. In the interior, the land rises in terraces and forms numerous elevated plateaus, mostly unfit for agricultural purposes. The northern part is taken up by the desert tracts called *sertaos*. The chief river is the São Francisco, which crosses the State from south to north. There are also a number of smaller streams flowing toward the Atlantic, such as the Paraguassu, Itapicuru, and the Rio de Contas, the former two navigable by steamers. The climate is hot and moist on the coast and dry in the interior. In the eastern part tobacco, sugar, cotton, coffee, and cocoa are raised, and the cultivation of rubber-trees has been recently introduced; but in the west more attention is paid to the raising of domestic animals. Gold and diamonds are mined chiefly in the Serra da Assurna, about the Paraguassu River, while salt and saltpetre are found in many other parts of the State. The commerce is to a large extent with Great Britain and France, and the exports consist of tobacco, sugar, coffee, diamonds, and skins. The chief railway line is the Bahia-São Francisco, mostly owned by the State. There is another line from São Amaro to Bom Jardim. Population, in 1890, 1,919,802. Capital, Bahia (q.v.). Consult *Almanak administrativo do estado do Bahia* (Bahia, 1898).

BAHIA BLANCA, blän̲′kȧ (Sp., White Bay). A growing port of Argentina, in the southern part of the Province of Buenos Ayres (Map: Argentina, E 11). It is on the Naposta River, 3 miles from its entrance into the bay of Bahia Blanca, where the town has a good harbor, which is in direct communication with Europe, while a railroad runs to Buenos Ayres. A fertile agricultural country is adjacent. The United States is represented by a consular agent. Population, about 10,000.

BAHIA HONDA, ōn′dȧ (Sp., Deep Bay). A harbor on the northern coast of Cuba, in the Province of Pinar del Rio, about 55 miles west of Havana (Map: Cuba, B 4). The harbor is one of the best on the island, 5 miles long by 3 miles wide, with a depth of 18 to 36 feet. The town of Bahia Honda is situated about 2 miles from the harbor. Sugar is cultivated to a considerable extent in the vicinity, and there are also copper and coal mines. At Aguacate are sulphur springs. Population, Bahia Honda and Aguacate, in 1899, 1278.

BAHMAN, bä′man, PRINCE. A character in "The Two Envious Sisters," a tale of the *Arabian Nights*. Leaving home in quest of adventure, he committed to his sister Parisadê a knife whose magic would reveal to her how he fared.

BAHNASA, bȧ-nä′sȧ, or **BEHNESA,** be-nä′sȧ. A town of Central Egypt, situated on the Bahr Yusuf (Joseph Canal). It occupies the site of the ancient Oxyrhyncus, or Pempte, the capital of a nome in which the fish Oxyrhyncus ('sharp-snouted') was held sacred. Plutarch relates that a feud arose between this city and its neighbor, Cynopolis (Gk. κύων, dog + πόλις, city), where the dog was revered, on account of mutual insults and injuries to their respective sacred animals. Under the Ptolemaic dynasty Oxyrhyncus was the seat of a Greek colony, and after the establishment of Christianity it became a city of convents, containing at one time more than 20,000 monks and nuns. Excavations conducted by Grenfell in the neighborhood in 1897 resulted in the discovery of a large number of valuable Greek papyri, including portions of the New Testament and of the works of classical authors (Homer, Herodotus, Thucydides, Sophocles, etc.), some letters, and many legal and commercial documents, illustrating life in Egypt during the Greek and Roman periods. The most important of these papyri have been edited, with translation and notes, by Grenfell and Hunt, under the title

The Oxyrhyncus Papyri (2 parts, London, 1898-99). The name of Bahnasa is sometimes applied to the oasis of Bahriyer, near the town.

BAHR, bär (Ar., a body of water). An Arabic word applied to both lakes and rivers. Bahr-el-Abiad, ä-bē-yäd′ (the White River), and Bahr-el-Azrak, el-äz′rĕk (the Blue River), are the chief branches of the Nile (q.v.). Bahr-el-Yemen, el-yā′men, is the Red Sea, and Bahr Lut, lo͞ot, the Dead Sea.

BÄHR, bĕr, Georg (1666-1738). A German architect. He was born at Fürstenwalde, Prussia. As master builder for the municipality of Dresden he constructed the celebrated Frauenkirche, or Church of Our Lady (1726-40), in that city, which is considered one of the most perfect examples of the baroque style in Germany. He was famous as a builder of Protestant Churches, and also erected a number of hotels in Dresden, such as the Hôtel de Saxe (1713-17) and the British Hotel (1720).

BAHR, bär, Hermann (1863—). A prominent Austrian author and journalist, born at Linz. He studied in the universities of Vienna, Czernowitz, Gratz, and Berlin, traveled extensively, and finally made his home in Vienna. In 1890 he became associate editor of the *Freie Bühne* (*Free Stage*), and in 1892 and 1893 was associate editor and critic of the *Deutsche Zeitung*. In 1894 he began to publish *Die Zeit*. Bahr is known as an acute critic of the theories of life exploited in modern German and French literature. He combats the so-called naturalistic school, and tries to introduce into German and Austrian literature some of the features of the French symbolists and 'decadents.' This effort is especially pronounced in his *Zur Kritik der Moderne* (1890), *Die Ueberwindung des Naturalismus* (1891), and *Neue Studien* (1891). He is considered the leader of the 'modern school' at Vienna, and of the so-called 'Young Austria' movement. His novels include *Die gute Schule* (1890), *Dora* (1893), *Neben der Liebe* (1893). Among his plays may be mentioned *Die neuen Menschen* (1887), *Die Mutter* (1891), *Die häusliche Frau* (1893), and *Die Nixe*, adapted from the Russian. He also published the politico-controversial work, *Die Einsichtslosigkeit des Herrn Schäffle* (1886).

BÄHR, bĕr, Johann Christian Felix, (1798-1872). A German classical scholar, born at Darmstadt. He studied at Heidelberg, where he gained the favor and friendship of Creuzer, whose symbolic system of interpretation in mythological matters he himself pursued at a later period. He was elected a professor in 1821. Previous to this he had occupied himself chiefly with the elucidation and criticism of Plutarch, the result of which was an annotated edition of *Alcibiades* (Heidelberg, 1822), and of *Philopœmen, Flaminius, Pyrrhus* (Leipzig, 1826). At the same time he collected and published the fragments of Ctesias. But a greater interest was excited by his *Geschichte der römischen Litteratur* (1828), which is noted for its clearness and comprehensiveness. Three supplements to this work also appeared: *Die christlichen Dichter und Geschichtschreiber Roms* (1836), *Die christliche-römische Theologie* (1837), and the *Geschichte der römischen Litteratur im karolingischen Zeitalter* (1840). One of his most important works is his version of Herodotus (1832-35). In 1835 he published his *De Universitate Constantinopoli Quinto Sæculo Conditâ*. He likewise contributed numerous articles to Jahn's *Jahrbücher für Philologie*, and kindred publications.

BÄHR, Otto (1817-95). A German jurist, born at Fulda. He studied law and political science at Marburg, Göttingen, and Heidelberg, and in 1840 became justice of the Supreme Court of Cassel. For his defense of the constitution during the struggle of 1850 he was made justice of the Supreme Court at Fulda in 1851, but in 1856 he was recalled to Cassel, and in 1863 was made a member of the Court of Appeals. In 1867 he became a member of the new Court of Appeals established at Berlin for Alsace-Lorraine, and was elected to the Reichstag from the city of Cassel, and to the Prussian House of Deputies. He became a justice in the Imperial Court at Leipzig in 1879, but retired in 1881 on account of ill-health. He wrote a highly important monograph, *Die Anerkennung als Verpflichtungsgrund* (1855 and 1894); an equally important treatise on *Der Rechtsstaat* (1864), and other works on German civil procedure.

BAHRAICH, bå-rīch′. The name of a district in the division of Faizabad, Province of Oudh, British India, and of a town, capital of the district, situated at the foot of the Himalayas, 65 miles northeast of Lucknow. Area of district, 2680 square miles; population, in 1891, 1,000,400; in 1901, 1,051,850. The town, on the junction line from Gonda to Basti, has a considerable trade, and manufactures fireworks and native cloth. It draws many thousands of pilgrims every year to the shrine of Masaud, a Mohammedan saint, which is situated here. Population, about 24,000.

BAHRAL, bä′ral. See Burhel.

BAHRDT, bärt, Karl Friedrich (1741-92). A German theologian of the extreme skeptical school. He was born August 25, 1741, at Bischofswerda, in Saxony, and studied at Leipzig, where he soon displayed extraordinary talents, together with some defects of character. His early theological writings betrayed the skeptical tendencies which were afterwards more fully developed. On account of his immoral conduct he was, in 1768, compelled to leave Leipzig, where he had been a popular preacher and professor. In Erfurt, his next residence, he was appointed professor of philosophy and Hebrew antiquities; but gave offense by his rationalistic teaching, as well as by his mode of life. He wrote *Briefe über die systematische Theologie* (1770-71, 2 parts), and *Wünsche eines stummen Patrioten* (1770), two works whose heterodoxy involved him in controversies and made his position untenable. In 1771 he went to Giessen, where he delivered theological lectures, and preached with approbation. His translation of the New Testament (1773) was regarded as so dangerous that the author was deprived of the privilege of teaching (1775). His creed, in fact, was simple deism, and one of the chief points in his theology was his rejections of miracles. Even the immortality of the soul was not positively maintained in his work. From 1775 to 1779 he was most of the time in great straits, and compelled to earn his support as best he might; but in 1779 he became professor of philosophy at Halle and won enormous popularity. But he overworked himself, and so resigned his professorship. When the Wöllner edict of 1788 against rationalism appeared he ridiculed it, anonymously, but was condemned to a year's imprisonment at Magdeburg. He employed his leisure in writing his autobiography, which is not noted for veracity (1790). Released, in 1790, he opened an inn at Halle, and gave himself up to riotous living. He then wrote the best book of the many he produced, *System der moralischen Religion* (1719). He died at Halle, April 23, 1792. For his biography consult J. Leyser, *F. Bahrdt sein Verhältniss zum Philanthropismus und zur neuern Pädagogik* (2d ed., Neustadt, 1870).

BAHREIN (bȧ-rān′) **ISLANDS** (Ar. *Bahrein*, two seas). A group of islands under British protection, situated in latitude 26° N. and longitude 50° 40′ E., on the western side of the Persian Gulf, and lying mostly within the bay to the north and west of the Katar Peninsula (Map: Asia, E 6). The chief island, called Bahrein, or Aval, has a north and south extent of 25 miles and a greatest breadth east and west of 9 miles; and while having flat, sandy coasts, yet is hilly in the interior. The soil is generally fertile, and the frequency of springs permits the somewhat extensive growing of Eastern tropical fruit, such as figs and dates, and of grains, particularly wheat and barley. The pearl fisheries, on banks submerged from 50 to 200 feet below the sea-level, and extending for a distance of nearly 125 miles along the shore, form an important industry. Bahrein possesses two cities of considerable size; Manama (25,000), the chief trading centre; and Moharek (22,000), the capital city. These islands have long been important trading points. Population, about 70,000.

BAHR-EL-GHAZAL, bär′el-gȧ-zäl′ (Ar., the river of gazelles). The name given to two rivers and their valleys in Central Africa. The first issues from the eastern end of Lake Chad, and after a northeasterly course of about 300 miles through a little-known desert region, loses its waters in the marshy district of the Bodele in latitude 16° N. The second river rises near the northeastern boundary of the Congo Free State, and after a northeasterly course, during which it receives the waters of several tributaries, unites with the Bahr-el-Jebel and joins at Sobat the White Nile or Bahr-el-Abiad, of which it is one of the principal affluents.

BAIÆ, bī′ē, now BAJA. A famous watering-place of the ancient Romans, situated on a beautiful bay in Campania, west of Puteoli (now Pozzuoli) and north of Cape Miseno. It was renowned for its lovely climate and scenery, its warm sulphur springs, and its excellent sea-food, especially the oysters of the neighboring Lucrine Lake. Many wealthy Romans had villas here, and the shore is dotted to-day with the remains of ancient houses, baths, and temples. Even under the Republic Baiæ was notorious for its loose morals, and under the Emperors life there was marked by extreme luxury and sensuality. With the decline of the Roman power Baiæ rapidly lost its importance, and was finally abandoned because of its malarious atmosphere. Recently it has attained some importance as a war harbor.

BAIER, bī′ẽr, JOHANN WILHELM (1647-95). A Lutheran divine. His *Compendium Theologiæ Positivæ* (Jena, 1686; many edd., rep., Saint Louis, Mo., 1882), was long the principal manual used by Lutheran divinity students.

BAÏF, bȧ′ēf′, JEAN ANTOINE DE (1532-89). A French poet, born at Venice. He was a member of the Pléiade (see PLEIADES), and is perhaps best known for his unsuccessful attempt to introduce into French poetry the rhymeless verse (*vers mesurés*) of the ancients. For the promotion of this, and of a further design for the simplification of French orthography, he founded an 'Académie de poésie et de musique' (1567-84). His *Poésies choisies* have been edited by Becq de Fouquières (1874), and his *Mimes, enseignements, et proverbes* by Blanchemain (1880). Consult Nagel, *Die metrischen Verse J. A. de Baïfs* (Leipzig, 1878).

BAIKAL, bī′käl′ (Turk., Tatar *bai*, rich + *kal*, *kul*, lake, sea; Mongol, *Dalai-Nor*, holy sea). The third lake in point of size in Asia, and the largest fresh-water lake of the Continent; situated in the south of Siberia, in the Government of Irkutsk, on the line of the Siberian Railway, in latitude 51° to 55° N., longitude 103° to 110° E. (Map: Asia, K 3). It is crescent-shaped, covers an area of 13,000 square miles, and has a shore-line of 1000 miles. Its length is 390 miles, and its breadth from 20 to 50 miles; height above the sea, 1513 feet; greatest depth, off its southwest shore, about 4500. The bottom of the lake is, therefore, about 2900 feet beneath the level of the ocean. Its waters are clear and transparent. The Baikal Mountains, a spur of the Altai, inclose the lake, which is fed by numerous streams, the chief of which are the Selenga and Bargusin. Its outlet is by the Lower Angara, a chief tributary of the Yenisei. Baikal has several islands, the largest of which is Olkhon. Petroleum wells, mineral and hot springs are found in the vicinity of the lake, and the region is subject to violent earthquakes. Baikal forms an important link in the chain of communication between Russia and China, and has two commercial ports. Of recent years steamboats have given a considerable impetus to its trade. Its sturgeon, salmon, and fresh-water seal fisheries are valuable, and large quantities of other fish are also taken. A peculiar fish, called the golomynka (*Comephorus Baicalensis*), which is almost one mass of fat, yielding train-oil, was at one time caught in immense numbers, but is now rather scarce. The surface of the lake is frozen from November to April; but traffic is carried on over the ice. Besides the Russians settled on the banks of the Selenga and Angara, the shores of Lake Baikal are also inhabited by tribes of the Buryats and Tunguses. Consult Drizhenko, "Exploration of Lake Baikal," in *Geographical Journal*, Vol. 11. (London, 1898).

BAIKIE, bā′kĭ, WILLIAM BALFOUR (1825-64). An English naturalist, traveler, and philologist. He was born at Kirkwall, Orkney, joined the British Navy, and was made surgeon and naturalist to the Niger Expedition in 1854. The senior officer died before reaching Africa, and Baikie took command and explored the Niger for 250 miles. In 1857 he was sent on a second expedition, but his vessel was wrecked, and all his companions returned to England. He settled for a time, with none but native assistants, at the confluence of the Binue and the Niger. Within five years he opened the Niger to navigation, made roads, and established a market for the native trade. He studied and made vocabularies of nearly fifty native dialects, and translated into Haussa portions of the Bible and Prayer Book. He published *List of Books and Manuscripts Relating to Orkney* (1847); *Historia Naturalis Orcadensis Zoölogy* (1848), and *Observations on the Haussa and Fulfulde Languages* (1861).

BAIKTASHI, bĭk-tä′shē. A mendicant order of dervishes (q.v.), which had its origin in the Fourteenth Century. It stood in close connection with the military order of the Janizaries, and was abolished in 1826, shortly after the destruction of that famous band.

BAIL (OF. *bailler*, to carry, give, deliver, from Lat. *baiulare*, to carry a burden, from *baiulus*, porter, carrier). The delivering up of a person under arrest, or against whom personal proceedings have been instituted, to accepted sureties who give security for his appearance at the proper time before the court, or for his carrying out the judgment of the court. The form of this security is usually a bond executed by the sureties, or a recognizance (q.v.) acknowledged by them. The term bail is also commonly given as well to the security given and to the persons who give the security.

Bail may be asked either in a criminal or a civil case, but in the latter only when the *person* is proceeded against. With the modern changes of the laws permitting the arrest of a debtor, the applicability of bail in civil cases has very greatly decreased. A person who has been bailed is placed in the custody of the surety who gives bail for him. He may, therefore, be arrested by the surety at any time and surrendered to the court, and when this is done the responsibility of the surety at once ceases. The surety is bound to produce his principal at the specified time unless prevented by the sickness, death, or legal imprisonment of the principal. In obtaining possession of the person of the principal, the surety has the right to call upon the sheriff or other law officers to assist him. An accused person has a right to demand the privilege of bail at any time between the arrest and the final judgment of the court. The responsibility of the surety ceases upon the appearance in court of the principal at the proper time. If he does not so appear, the bond given as security may at once be declared forfeited by the court; whereupon execution may issue as for any judgment, and collection may be made forthwith. Under the common law, bail could not be demanded in cases of felony. By statute law in Great Britain, and now universally in the United States, however, bail can be demanded in all cases except those of capital offenses. Considerable discretion is left to the magistrate as to whether an offense may or may not be such as properly to admit of bail. Thus, where an assault has been committed under such circumstances as to make it murder if the injured person should die, and where there is reasonable probability that death may ensue, a magistrate in any of our States would refuse to accept bail.

Generally speaking, in the United States the common law is closely followed in the regulation of bail. The English Bill of Rights (1 Will. and M. 2, ch. 2), the Constitution of the United States, and those of the several States prescribe that excessive bail shall not be demanded. What excessive bail may be is generally left to the determination of the court, though the criminal codes of many States specify a minimum sum for each class of offenses against the law, a lower amount than which shall not be accepted as security in such cases. A *bail piece* was originally a certificate issued to the surety attesting his act of offering bail; at present it generally signifies a warrant issued to the surety upon which he may arrest the person for whom bail has been taken. The term *straw bail* is a familiar designation of bail offered by persons not possessing the requisite financial responsibility, but willing to swear that they do possess it. The term is said to have originated in the fact that in the English bankruptcy courts such rascals were always in waiting in the outer halls, and that it was their custom to carry straw fastened on the shoe to signify the kind of service they were willing to render. At the present day, in civil cases, bail cannot be required unless there is some allegation of fraud involved, such as that the defendant is suspected of the design of putting property out of the reach of the court, or where he is arrested in a debt proceeding, and affidavit is made that he is about to leave the State, or where a tort or personal injury of a malicious kind is alleged. The old distinction in civil cases between common bail (or bail below) and special bail (bail above or bail to the action) is, therefore, not now of such consequence as formerly. Common bail, or bail below, was in effect an undertaking that the defendant would appear before the court at the day and place named in the process; special bail was a more general undertaking, entered into after such appearance had been made, that the defendant should satisfy the judgment of the court in damages, debt, or cost, or failing to do so, should surrender his person to the court. The statutes of the States and the practice of the courts usually require persons giving bail to be possessed of real estate or property not easily removable from the jurisdiction of the court. In admiralty bail is often required, in actions *in rem*, to procure the discharge of the property proceeded against. The bail is in the form of a stipulation, by which the owner of the seized property and his sureties undertake to pay and perform the final decree in the case. Consult the authorities referred to under Practice.

BAILÉN, bī-lān′. A town in the Province of Jaen, Spain, 20 miles north of Jaen (Map: Spain, D 3). It is celebrated as the place where, in July, 1808, the French general, Dupont, capitulated, surrendering 18,000 men to the Spaniards under Castaños—the first great disaster to the French arms in the Peninsular War. Galena and zinc blende are mined in the vicinity. Population, in 1897, 7595. Consult Galdós, "Bailén," in *Episodios nacionales*, Vol. II. (Madrid, 1882).

BAILEY, bā′lĭ (OF. *baile*, Med. Lat. *ballium* = Lat. *vallum*, wall = a court). Originally the bailey was any outer line of defense; then, more specifically, the wall of the outer court of a feudal castle, or any of its inner walls of defense. Hence it came to mean the whole space inclosed within these walls, except that covered by the keep. (See Castle.) With the development of feudal architecture there were several distinct courts, with their buildings and embattled walls, and each was called a bailey. Thus, there were the outer, the middle, and the inner baileys. The entrance to the outer bailey was by a drawbridge over the moat and through a strong gate, and precautions were also taken to defend the inner baileys. Each bailey had its special function. (See Castle; Gothic Architecture; Romanesque Art.) In towns the bailey meant the entire space inclosed within the walls, or *vallum*, and was used in connection with civil and criminal jurisdiction; hence the Old Bailey in London and the Bailey in Oxford. In France the governor of a town was long called a *bailli*, and his subordinates were bailiffs.

BAILEY, Florence Merriam (1863—). An American writer on ornithology. She was born at Locust Grove, N. Y., studied at Smith College, Northampton, Mass., and has written of bird-life in the intimate fashion made so popular by the essays of John Burroughs. Her *Birds Through an Opera Glass* (Boston, 1889) was among the first books to direct attention to that method of observation. She has also published *A-Birding on a Bronco* (ib. 1896), and *Birds of Village and Field* (ib. 1898).

BAILEY, Gamaliel (1807-59). An American journalist, prominent in the anti-slavery conflict. He was born at Mount Holly, N. J., the son of a Methodist preacher; graduated at the Jefferson Medical College, Philadelphia, in 1827; and for several months, after 1829, was the editor, at Baltimore, of *The Methodist Protestant*, the short-lived official organ of a radical offshoot of the Methodist Episcopal Church. He went to Cincinnati in 1831, and was physician to the cholera hospital during the great cholera epidemic of that year. Converted to Abolitionism through the famous Lane Seminary debates of 1834, he thereafter took an active part in the anti-slavery conflict, and in 1836 assisted James G. Birney (q.v.) in establishing a weekly anti-slavery paper, *The Cincinnati Philanthropist*, of which he became proprietor and editor-in-chief in September, 1837. His press was repeatedly destroyed by mobs and his life was often threatened, but he nevertheless continued in his work until 1847, and after 1843 was editor also of a daily paper, *The Herald*, likewise established by himself. In 1847 he removed to Washington and became the editor of a newly established anti-slavery paper, *The National Era*, which, under his management, attained a wide circulation, exerted a powerful influence, and came to be regarded in many quarters as the central organ of Abolitionism. To this paper Mrs. Stowe, Whittier, Amos A. Phelps, and Mrs. Southworth were regular contributors, and it was in it that, in 1852, Mrs. Stowe's *Uncle Tom's Cabin* first appeared. In 1848 the *Era* office was besieged for three days by a pro-slavery mob, which finally dispersed under the influence of an eloquent address by Dr. Bailey. Consult an article, "A Pioneer Editor," in *The Atlantic Monthly*, Vol. XVII. (Boston, 1866).

BAILEY, Jacob Whitman (1811-57). An American naturalist, known as the pioneer in microscopic research in America. He was born at Auburn, Mass., and in 1832 graduated at West Point, where, after 1834, he was successively assistant professor, acting professor, and professor of chemistry, mineralogy, and geology. He devised various improvements in the construction of the microscope, and made an extensive collection of microscopic objects and of algæ, which he left to the Boston Society of Natural History. In 1856 he was chosen president of the American Association for the Advancement of Science. He wrote many articles on scientific subjects for the *American Journal of Science* and for scientific societies, a report on the infusorial fossils of California, and a valuable volume of *Microscopical Sketches*, containing more than 3000 original figures. A sketch of his life is given in the *American Journal of Science and Arts*, Vol. XXV. (New Haven, 1847).

BAILEY, James Montgomery (1841-94). An American journalist, who became widely known as the '*Danbury News* Man.' He was born at Albany, N. Y., and, after receiving a common-school education, learned the trade of a carpenter. He removed to Danbury, Conn., in 1860, and worked at his trade for the two following years, but found time to write occasionally for the newspapers. During the Civil War he served in the Seventeenth Connecticut Volunteers. In 1870 he established the *Danbury News*, for which he wrote the humorous sketches, sometimes original, often simply descriptive of commonplace happenings, which won for him a national reputation, and made his paper known throughout the country. His first book, *Life in Danbury*, was published in 1873; it consisted of selections from his newspaper articles. His other publications were *The Danbury News Man's Almanac* (1873), *They All Do It* (1877), *England from a Back Window* (1878), *Mr. Phillips's Goneness* (1879), *The Danbury Boom; with a Full Account of Mrs. Cobleigh's Action Therein* (1880).

BAILEY, Joseph (1827-67). An American soldier, born in Salem, Ohio. He entered the Federal Army as captain in 1861, in 1862 was appointed acting engineer of the New Orleans defenses, and in 1863 was promoted to be lieutenant-colonel. When, in 1864, the Red River was found too shallow for the passage of Admiral Porter's gunboats, Bailey, in face of opposition from the engineers, superintended the construction of dams which deepened the water in mid-channel, and thus permitted the vessels to descend. He was promoted to be brigadier-general in 1864, resigned from the army in 1865, and, having removed to Missouri, was killed there while executing his duties as sheriff.

BAILEY, Liberty Hyde (1858—). An American horticulturist and botanist. He was born at South Haven, Mich., graduated at Michigan Agricultural College in 1882, and became professor of horticulture in that institution, 1885. In 1888 he was appointed to the chair of general and experimental horticulture at Cornell University. He has made numerous important contributions to the science and practice of horticulture, and has written extensively on horticultural and botanical subjects. His most important botanical work has been on the genera Carex, Rubus, Prunus, and Vitis. He has done very important educational work as an organizer of the nature-study and extension work at Cornell University. He edited *The American Garden* (1890-93); The "Rural Science and Gardencraft Series" (New York, 1895-1901); and *Country Life in America* (New York, 1902—). Among the works of which he is author are: *The Cyclopædia of American Horticulture* (New York, 1900-02); *The Survival of the Unlike* (New York, 1896); *Sketch of the Evolution of Our Native Fruits* (New York, 1898); *Lessons with Plants* (1898); *Garden-Making* (New York, 1900); *The Principles of Fruit-Growing*, "Rural Science Series" (New York, 1897); *The Nursery Book* (New York, 1897); *The Philosophy of the Crossing of Plants* (Boston, 1891); besides numerous articles in the *Reports* of the United States Department of Agriculture and the *Reports* of the Cornell University Agricultural Experiment Station.

BAILEY, Loring Woart (1839—). An American chemist and geologist. He was born at West Point, N. Y. He was graduated from Harvard University in 1859, and has been, since 1861, professor of chemistry and natural history at the University of New Brunswick. He is the author of a number of scientific papers, and wrote: *Mines and Minerals of New Brunswick* (1864); *Geology of Southern New Brunswick* (1865); and an elementary work on natural history.

BAILEY, Nathan or Nathaniel (? -1742). An English lexicographer. He died at Stepney in 1742. He published *An Universal Etymological English Dictionary* in 1721, adding a supplementary volume in 1727. This work was so popular that by 1802 it had reached its thirtieth edition, and it is known that Johnson made liberal use of it in preparing his own dictionary. Among Bailey's other works is *The Antiquities of London and Westminster* (1726). In 1883 the English Dialect Society reprinted the Eighteenth-Century dialect words preserved in Bailey's dictionary. This work was one of the sources from which Chatterton drew his pseudo Old English words.

BAILEY, Philip James (1816-1902). An English poet, born at Basford, Nottingham. He studied at the University of Glasgow, and was called to the English bar in 1840, but never practiced. His first poem, *Festus*, which was begun before he was 20 years old, was published in 1839. It was received with great enthusiasm, its author being classed by many critics of the day with Shakespeare and Milton. This extravagant estimate was naturally succeeded by a reaction, and for many years *Festus* was practically forgotten. In 1900, however, a renewed interest was manifested in it, and something like a fair critical estimate of the poem was made. *Festus* does, in fact, contain many passages of great power, and its language is often striking and majestic. On the other hand, it is excessively rhetorical; and this defect gives, upon a second reading, the impression of artifice and insincerity. It was followed by *The Angel World* (1850), *The Mystic* (1855), and *The Universal Hymn* (1867), all of which have since been made a part of *Festus*. Bailey also published *The Age*, a satire (1858). Consult the eleventh or Jubilee edition of *Festus* (London, 1889). See English Poetry, Spasmodic School of.

BAILEY, Samuel (1791-1870). An English writer on politics, political economy, philosophy, and criticism. He became a banker, and at his death left £90,000 to his native town, Sheffield. His writings generally are distinguished by independent thinking, logical precision, and warm aspirations for the improvement of mankind. His treatises on the mind, while abounding in original suggestions, expand and enforce the views of the school of Locke in metaphysics and what is termed the doctrine of utility in morals. Among his works the following may be mentioned: *A Critical Dissertation on the Nature, Measures, and Causes of Value* (1825); *The Right of Primogeniture Examined* (1837); *Letters on the Philosophy of the Human Mind* (three series, 1855, 1858, 1863); and *The Received Text of Shakespeare's Dramatic Writings and Its Improvement* (1862-66.)

BAILEY, Solon Irving (1854—). An American astronomer, born at Lisbon, N. H. He graduated in 1881 at Boston University, and was subsequently appointed associate professor of astronomy at Harvard. In 1889 he established at Arequipa, Peru, a southern station of the Harvard Observatory, and in 1893, on the summit of Mount Mistí, at an elevation of 19,000 feet, the most loftily situated scientific station in the world. Papers by him are to be found in the *Annals* of the Harvard Observatory.

BAILEY, Theodorus (1805-77). An American naval officer, born in Chateaugay, N. Y. He entered the navy in 1818, became lieutenant in 1827, was commissioned commander in 1849 and captain in 1855; and in 1861 was assigned to the command of the *Colorado* in the blockade of Pensacola. In 1862 he was second in command of the fleet sent under Farragut against New Orleans. He led the attack upon the forts, and was dispatched by Farragut to demand the surrender of the city. He was promoted in the same year to be commodore, and was appointed commander of the Eastern Gulf blockading squadron, in which post it is said that in eighteen months he captured more than 150 blockade runners. Subsequent to the war he was commandant at the Portsmouth (N. H.) Navy Yard, and in 1866 was retired with rank of rear-admiral.

BAIL'IE (Scotch for *bailiff*). A superior officer or magistrate of a municipal corporation in Scotland, with judicial authority within the city or burgh. In royal burghs, the office is in some respects analogous to that of alderman in England. The chief magistrate of a Scotch corporation, called the provost (q.v.), and often one or more of the bailies, are, by virtue of their office, in the commission of the peace. There are also *bailies of regality* and *barony*, who are appointed by the superior or overlord of the manor (q.v.), with limited powers. There is a bailie for the sanctuary or abbey of Holyrood, appointed by the Duke of Hamilton as hereditary keeper, and having jurisdiction within the precincts. See Bailiff.

BAIL'IFF (OF. *bailiff*, Fr. *bailli*, administrator, Low Lat. *bailivus*, from *baiulus*, carrier, one who carries burdens, takes charge of). An officer exercising superintendence on behalf of some superior authority. Through all the changes of application the word has undergone in the course of history, it has denoted an overseer of some kind. At the Greek Imperial court in Constantinople, the chief tutor of the Imperial children was called *baiulus*. The same title seems also to have been given in Constantinople to the superintendent of the foreign merchants, who was appointed by the Venetians, and it may possibly be for this reason that the title *balio* came at length to be applied also to the Venetian ambassadors themselves. In France, the royal *baillis* were at one time commanders of the troops, administrators of the royal domains, and judges, each one in his district. Proprietors of estates, also, possessing supreme jurisdiction, appointed *baillis* to superintend their courts of justice. As very little knowledge was required for these situations, and as they might be purchased, they were held in little estimation; and in later times, the *baillis* became standing characters on the stage, held up to ridicule on account of their ignorance and their absurd pretensions, as well as for cheating and injustice.

In the law, the term bailiff means: (a) a superior servant or agent, in which sense the term is synonymous with *steward* or *factor;* and (b) an officer of the court, a tipstaff, a sheriff's officer or deputy. Its first application is to a person employed in the administration and charge of lands, goods, or chattels, to make the best benefit for the owner. The bailiff is liable in an action of account for the profits which he has raised or made, or which he might, by proper industry and care, have raised or made. The term is not in general use in American law.

In the second sense in the English law, bailiffs may be either officers appointed by the judges of certain courts, or, in more modern times, officers appointed over their respective districts by the sheriff to perform certain duties, including the service of process of arrest, collection of fines, and summoning of juries. The sheriff being answerable for their misdemeanors, they are usually bound in an obligation with sureties for the due execution of their office, and were called *bound bailiffs*. *Special bailiffs* are officers appointed by the sheriff on the application of a party in a civil suit for some particular purpose, and the sheriff is not held responsible for their acts in this regard. In the United States, the term bailiff is seldom used, the corresponding officer being the deputy or undersheriff. Deputies are of two classes: (1) general deputies, or those who by virtue of their appointment have authority to execute all the ordinary duties pertaining to the sheriff's office; and (2) special deputies, or officers *pro hac vice*, to execute particular processes for a special purpose. The practices in the various States are similar in regard to these matters. See SHERIFF.

BAILIFF'S DAUGH'TER OF ISLINGTON, ĭz'lĭng-ton, THE. An old ballad in Bishop Percy's *Reliques of Ancient English Poetry*. The heroine, after dismissing her lover, finds him seven years later, in London, and recalls him to a recollection of her.

BAIL'IWICK (*Bailiff*, *bailie* + *wick*, AS. *wīc*, village, from Lat. *vicus*, village). In law, that county or district within which a bailiff (q.v.) may exercise jurisdiction. In modern times bailiwick is generally synonymous with county, and as such includes the limits within which a sheriff's deputies may execute process.

BAILLAIRGE, bå'yârzh', CHARLES P. FLORENT (1827—). A Canadian architect. He was born in Quebec, was educated at the Seminary there, and was for some time an engineer. He designed the "Monument des Braves de 1760," in Quebec; was joint architect for the Parliament buildings at Ottawa (1863-65), and in 1893 erected the aqueduct over the Saint Charles River. Many of the churches in Quebec are built from his designs, as are also the Laval University building and the Music Hall there. In 1874 he was made president of the Quebec Association of Architects. Among his publications are: *A Treatise on Geometry and Trigonometry* (Quebec, 1866); *Nouveau dictionnaire français* (1888); and a *Dictionary of English Rhymes and Synonyms* (1890).

BAILLARGER, bå'yär'zhå', JULES GABRIEL FRANÇOIS (1809-91). A French physician; born at Montbazon (Indre-et-Loire). He devoted himself principally to mental disorders, and in 1842 obtained a prize from the Academy of Medicine for his admirable essay entitled *Des hallucinations, des causes qui les produisent et des maladies qu'elles caractérisent*, published in Vol. XIII. of the *Mémoires* of the society. In association with Longet and Cerise, he founded in 1843 a review especially devoted to the study of nervous affections and mental diseases, under the title *Annales médico-psychologiques du système nerveux*. In recognition of his splendid services during the second outbreak of the cholera in 1849, Baillarger was decorated with the medal of the Legion of Honor.

BAILLET, bå'yå', ADRIEN (1649-1706). A French scholar and critic, born at Neuville-au-Hez, Beauvois, and educated there. His principal work is *Jugements des savants sur les principaux ouvrages des auteurs* (1685-86). He also wrote on historical subjects. In 1676 he was ordained to the priesthood, and in 1680 he became librarian to the Advocate-General.

BAILLEUL, bå'yēl'. The chief town of a canton, arrondissement of Hazebrouck, in the Department of Le Nord, France, 46½ miles southeast of Calais by rail. It is picturesquely situated on rising ground north of the River Lys, near the Belgian frontier. It is a quaint town of Flemish origin; the Church of Saint Vaast dates from the Fourteenth Century, and the hôtel-de-ville from the Fifteenth; there is a museum of antiquities and paintings. Hand-made lace is the chief industry, but the town has also manufactures of woolens, leather, cheese, brandy, pottery, and soap. Population, in 1896, 13,450.

BAIL'LIE, Lady GRIZEL (1665-1746). A Scotch poet, born in Berwickshire. She was the daughter of the Scottish patriot, Sir Patrick Hume, afterwards first Earl of Marchmont, and in 1684 supplied him with food during his concealment in the vault beneath Polwarth Church. She shared her father's exile in Utrecht (1686-88). In 1692 she married the son of Robert Baillie, of Jerviswood. Some ballads written by her are preserved in Allan Ramsay's *Tea-Table Miscellany* (1724-27). The best known of them is "And Werena My Heart Licht, I wad Dee."

BAILLIE, HARRY. The shrewd proprietor of the Tabard Inn, in Chaucer's *Canterbury Tales*. It is in his hostelry that the pilgrims pass the first night of their journey; and in the morning he decides to continue on the road with them. He acts as the toastmaster of this literary feast, linking the different tales together by his little prefatory speeches.

BAILLIE, JOANNA (1762-1851). A Scotch dramatist and poet. She was born September 11, 1762, at Bothwell, in Lanarkshire. In 1784 she went to reside in London, where her brother had settled as a physician. Here and in Hampstead she remained till her death, February 23, 1851.

Through her long life she enjoyed a large share of the esteem and affection of her literary contemporaries. Her greatest achievement is undoubtedly the *Plays on the Passions*, which, though erroneous in conception, are full of noble and impressive poetry, and often display intense dramatic power. The principle upon which Miss Baillie proceeded in the construction of these plays was to take as the subject of each one some passion, like hate, love, fear, or remorse, and to exhibit its influence on a character supposed to be actuated by nothing else. The leading personages of Miss Baillie's plays are, therefore, rather impersonations of certain elements of human nature than genuine human beings. Still, there are scenes, in her tragedies especially, where the interest of the reader is intensely excited by the great art shown in the minute delineation of a particular passion, and where he is forced to forget the artificial theory underlying it. The first volume of the *Plays on the Passions* appeared in 1798, and met with remarkable success. Four years afterwards she published a second volume; in 1804, *Miscellaneous Plays;* in 1812, the third volume of her *Plays on the Passions;* and in 1836, three volumes of dramatic poetry. The most popular, as well as the most powerful of her works, is the tragedy of *De Montfort*. It was performed in London, Kemble acting for eleven nights the character of the hero. Many of Miss Baillie's minor pieces are very sweet, simple, and beautiful; some of them are humorous ballads and poems in the Scottish dialect. Consult: Baillie, *Dramatic and Poetical Works* (London, 1851); Thackeray-Ritchie, *Book of Sibyls* (London, 1883).

BAILLIE, Matthew (1761-1823). A Scotch anatomist, born in Lanarkshire. He received his education at the universities of Glasgow and Oxford, and subsequently continued his anatomical studies in London. In 1795 he published a small work entitled *The Morbid Anatomy of Some of the Most Important Parts of the Human Body*, which contained an account of numerous observations made by his uncle and himself. It had a remarkable influence on the study of medicine, and excited in a greater measure, perhaps, than any other book, a spirit of careful induction among professional men. In 1799 Baillie relinquished his anatomical lectureship, and in 1800, his position at Saint George's Hospital, which he had held for thirteen years. He now devoted himself exclusively to private practice, and after 1810 acted as physician to the King.

BAILLIE, Robert (1599-1662). A Scotch Presbyterian clergyman. He was born at Glasgow, and was educated in its university. In 1622 he was episcopally ordained, but soon after was settled in Kilwinning. In 1640 he was one of the commissioners to go to London to prepare charges against Archbishop Laud. In 1642 he was appointed first professor of divinity at Glasgow; in the next year he sat as a commissioner in the Westminster Assembly of Divines, and there asserted the divine right of presbytery as intolerantly as the churchmen had asserted the divine right of episcopacy. In 1649 he was one of the delegation sent to Holland to ask Charles II. to accept the covenant and crown of Scotland. In 1661 he was made principal of Glasgow University. He died there in July, 1662. He was one of the most learned and accomplished of the Scotch clergy. His *Letters and Journals* (1637-62, best edition by David Laing, 3 vols., Edinburgh, 1841-42) is a valuable contribution to knowledge of the times.

BAILLIE-GROH'MAN, William A. (1851—). An English sportsman and author. He was educated in England and on the Continent, had wide experience in the pursuit of big game, and as a rifle-shot won about seventy prizes in America and Europe. His collection of prints and books pertaining to the chase is considered valuable. He was appointed a justice of the peace of British Columbia, and has published *Tyrol and the Tyrolese* (1876); *Sport in the Alps* (1896); *Sport and Life in North America* (1900); and other similar works.

BAILLIE OF JER'VISWOOD, Robert (?-1684). A Scotch patriot and martyr to the cause of civic liberty. He was a native of Lanarkshire and came into prominence in 1676 by opposing the tyranny of the Duke of Lauderdale, the favorite of Charles II., in the illegal arrest of a relative. By means of an antedated warrant, Baillie himself was thrown into prison, and, indignantly refusing to pay the fine inflicted, was kept there four months. After this he was a marked man, and on the discovery of the Rye House Plot was arrested on no stronger evidence than certain letters, really of a non-compromising character, to the leaders of the Puritan party in London. He was kept in prison twenty months, and became seriously ill. At last, in a dying condition, he was brought before the High Court in Edinburgh on a charge of treason, and although no valid evidence was presented to show his complicity in the plot, was adjudged guilty on the morning of December 24, 1684, and barbarously hanged the same afternoon. His bearing throughout was dignified and heroic, and he has been called the 'Scottish Algernon Sidney.' Consult *The Tryal and Process of High Treason and Doom of Forfaulture Against Mr. Robert Baillie of Jerviswood, Traitor* (London, 1685).

BAILLOT, bȧ'yō', Pierre Marie François de Sales (1771-1842). A French violinist and composer. He was born at Passy and died at Paris. After receiving his musical education in Paris and Rome, he appeared in public in 1791, and in 1795 became professor of the violin in the Paris Conservatoire, which post he held until his death. He studied harmony and counterpoint under Catel and Cherubini, became a member of Napoleon's private orchestra in 1802, traveled in Russia in 1805-08, and in 1814 organized chamber-music concerts in Paris, which gained him reputation as a quartette-player. In 1815-16 he made a tour in Holland, Belgium, and England, and became a member of the London Philharmonic Society. He was director of the orchestra at the Paris Opera in 1821-31, of the Concerts Spirituels in 1822-24, and of the Royal Orchestra in 1825. Baillot was the last great representative of the classical school of violin-playing in Paris: he was famous as a teacher, and his *Méthode du violon*, adopted by the Conservatoire, was considered by Fétis one of the best works of its kind. His compositions are difficult, and are almost forgotten. Consult Wasielewski, *Die Violine und ihre Meister* (Leipzig, 1893).

BAILLY, bȧ'yē', Antoine Nicolas (1810—). A French architect, born in Paris. After producing various works of importance in that city, he was appointed architect for the dioceses of Bourges, Valence, and Digne. In this capacity he reconstructed the cathedral of Digne, and designed two beautiful churches at Bourges and Valence. Made chief architect of the Third Division in Paris (1860), he built the Lyceum of Saint Louis and the new Tribunal of Commerce. When the Société des Artistes Français was founded, he was made its president. He received the Cross of the Legion of Honor in 1853, and became commander in 1881.

BAILLY, Jean Sylvain (1736-93). A French savant. He was born in Paris. Originally intended by his father for an artist, he first turned aside into literature, until, becoming acquainted with Lacaille, he was induced to study astronomy, which proved to be the true sphere of his genius. In 1763 he presented to the Académie des Sciences his *Lunar Observations;* in 1766 appeared his *Essay on the Satellites of Jupiter, with Tables of Their Motions;* and in 1771 a treatise on the light of these satellites. His historico-scientific works, especially his *History of Indian Astronomy*, are full of learning and ingenious disquisition, and written with great elegance. In 1777 he published his *Letters on the Origin of the Sciences*, and in 1799 his *Atlantis of Plato.* In 1784 he was elected a member of the Académie Française, and in the following year of the Académie des Inscriptions. The *éloges* which he wrote about this period for the Académie des Sciences, viz. those on Charles V., Molière, Corneille, Lacaille, Leibnitz, Cook, and Gresset, were very highly praised. The Revolution interrupted his peaceful studies. During the earlier part of it he occupied a very prominent position. Elected President of the National Assembly, June 17, 1789, and Mayor of Paris on the 15th of July, he conducted himself in these capacities with great integrity and purity of purpose; but at last lost his popularity by allowing the National Guard to fire on the masses who were assembled in the Champs de Mars, on the 17th of July, 1791, to demand the dethronement of the King. He now threw up his mayoralty, considering it impossible to satisfy either party, withdrew altogether from public affairs, and went to live first at Nantes, and afterwards with his friend Laplace at Melun. Here he was seized by the Jacobin soldiery and brought to Paris, where he was accused of being a conspirator, and was executed November 12, 1793. Among his papers were found, and afterwards published, an *Essay on the Origin of Fables* (1799), and *Memoirs of the Revolution* (1804).

BAIL'MENT (for derivation, see Bail). A delivery of something of the nature of personal property by one party to another, to be held according to the purpose or object of the delivery, and returned or delivered over when that purpose is accomplished. The party delivering is termed the *bailor*, the recipient, the *bailee*. A bailment is distinguished from a sale in that the identical thing delivered is to be restored in the same or an altered form, and that title is not transferred. Bailments are generally divided into three classes, formerly designated by terms derived from the civil law. (1) That for the sole benefit of the bailor or the party whom he represents. This includes: (a) *Depositum* (deposit), a delivery of personal property to be kept by the depositor without reward, and delivered according to the purpose of the trust. (b) *Mandatum* (mandate), or a delivery of personal property in regard to which the bailee engages to do some act without compensation. (2) That for the sole benefit of the bailee or the party whom he represents. This is *commodatum* (loan), a gratuitous lending of an article for a certain time, to be used by the bailee and returned without recompense. (3) That for the benefit of both parties. This class comprises: (a) *Pignus* (pledge), a delivery or deposit of personal property as a security for some debt or engagement, as when goods are left with a pawnbroker, or stocks or bonds as collateral security on a note. (b) *Locatio conductio* (hiring) for recompense. This embraces four kinds: *Locatio rei*, the hiring of the use of the bailed article, as when a person hires a carriage; *locatio custodiæ*, the hiring of the keeping or storage of an article, as a deposit in a warehouse; *locatio operis faciendi*, the hiring of labor or services to be performed on or about the property, as a watch left with a watchmaker for repairs; *locatio operis mercium*, the carriage of goods for hire, as the work of a common carrier.

The bailee having possession of the chattel, may maintain the proper actions for injuries thereto, while if permanent injury be done to the chattel, the bailor may prosecute a special action for the loss to his reversionary interest. The important question, however, of the law of bailments is the determination of the obligations and liabilities of the respective parties in their several relationships. Thus, when the bailment is for the bailor's sole benefit, the bailee is required to exercise but slight care, and is responsible only for gross negligence; but when wholly for the bailee's benefit, in a gratuitous loan of the second class, he must exercise the greatest care, and is answerable for slight negligence; when the transaction is reciprocally beneficial to both parties, the bailee is required to exercise only ordinary care and is answerable only for ordinary neglect. It follows from this that a bailee, in the absence of special agreement, is not an insurer of the chattel placed in his hands, and is not responsible for losses or damages necessarily incident to the purpose of the bailment; but he is liable for the violation of the obligation imposed by the terms of the contract, or for the misappropriation of the chattel or the misdirection of its use. By the common law an exception is made in the case of innkeepers and common carriers. The former, by the necessity of the conditions, was originally made an insurer of the goods of his guest in his keeping, except from losses occurring by the act of God, the public enemy, or through the friend or servant of the guest. But this rule has been modified by statute in conformity with modern conditions, both in England and the United States; and the innkeeper is now generally held only to the exercise of a high degree of care. In many States, by providing a safe deposit and giving proper notice, he may require the guest to deposit his valuables, in default of which the innkeeper's liability does not exceed that of an ordinary bailee. It is also generally recognized that a common carrier's liability as an insurer against everything except the act of God or the public enemy may, by proper notice and fair and reasonable special contract, he reduced to exclude all losses and injuries except those resulting from his own or his servants' negligence. In the State of New York this doctrine is carried to the extent of permitting exception even from those damages resulting from his own negligence, but not from willful wrongdoing. The contract of a carrier of passengers is not a contract of bailment. (See INN, INNKEEPER; CARRIER, COMMON.) Consult: Schouler, *Treatise on the Law of Bailments*, 3d ed. (Boston, 1897); Story, *Commentaries on the Law of Bailments*, 9th ed. (Boston, 1878); Beal, *Law of Bailments*, with notes to Canadian cases (London, 1900).

BAIL'Y, EDWARD HODGES (1788-1867). An eminent English sculptor, born at Bristol. In 1807 he entered the studio of Flaxman in London, and in 1809 received medals from the Society of Arts and Sciences, and the Royal Academy. The statue of Nelson in Trafalgar Square, London, is one of his finest works. His other sculptures include "Eve at the Fountain," "Hercules Casting Hylas into the Sea," "Psyche," "Eve Listening to the Voice," and statues of Lord Mansfield and Earl Grey.

BAILY, FRANCIS (1774-1844). An eminent English astronomer, born at Newbury. In the midst of active business as a London stockbroker, he laid the foundation of his scientific fame, and during the years of life usually devoted to repose, underwent labors and rendered services to astronomy which entitle him to be regarded as one of the most remarkable men of his time. Among the chief of these services were his share in the foundation of the Astronomical Society, and in the improvement of the *Nautical Almanac*, his laborious repetition of Cavendish's pendulum experiments, and the production of the Astronomical Society's star-catalogue. He was also the first fully to describe the phenomenon known as Baily's beads, which is observed in connection with total eclipses of the sun. Just before the beginning and after the end of the obscuration of the sun by the moon's disk, the thin crescent-shaped unobscured portion of the sun seems to become suddenly discontinuous, and looks like a belt of bright spots varying in size and separated by dark spaces. The resulting appearance may be compared to a string of beads. The phenomenon is the effect of irradiation and the inequalities of the moon's edge. In addition to several standard works on life-annuities, etc. (1808-13), and an immense mass of contributions to the *Memoirs of the Astronomical Society*, Baily wrote a valuable *Life of Flamsteed* (1835), which gave rise to much discussion on the subject of that eminent man's connection with Newton.

BAILY'S BEADS. See BAILY, FRANCIS.

BAIN, bān, ALEXANDER (1818-1903). An English psychologist. He was born at Aberdeen, Scotland, and studied at Marischal College, from 1836 to 1840, obtaining the degree of M.A. He taught moral and natural philosophy at this institution from 1841 to 1845, and afterwards became successively professor of natural philosophy at Anderson's University, Glasgow; assistant secretary to the Metropolitan Sanitary Commission, from 1847 to 1855; secretary of the General Board of Health, from 1848 to 1850; examiner in logic and moral philosophy at the University of London, from 1857 to 1862; examiner in moral science for the India Civil Service, from 1858 to 1860, and in 1863; professor of logic and English literature in the University of Aberdeen, from 1860 to 1880; and lord rector of the University of Aberdeen, in 1881. He received the degree of LL.D. from Edinburgh University in 1859. From the year 1840, Bain was a frequent contributor to the *Westminster Review* and Chambers's *Papers for the People*, and *Information for the People*. In these publications he became well known both for his exceptionally apt popularizations and for his own researches in fields of applied science. But his enduring fame will be associated with his treatises on psychology. His best-known works are: *The Senses and the Intellect* (1855); *The Emotions and the Will* (1859); *The Study of Character* (1861); *Mental and Moral Science; A Compendium of Psychology and Ethics* (1868); *Logic, Deductive and Inductive* (1870); *The Relation of Mind and Body* (1873); *Education as a Science* (1879). Bain also edited Paley's *Moral Philosophy* (1852), published a biography of James Mill (1881), a criticism of J. S. Mill (1882), assisted in editing Grote's *Aristotle*, edited Grote's *Minor Works*, and wrote several authoritative works on composition and rhetoric.

Bain was a stanch empiricist, emphatically opposed to all transcendental and *a priori* methods of procedure. Following Hartley's lead, he sought to supply a physiological basis for all psychical facts. Perhaps the best characterization of his place in psychology is given by J. S. Mill in *Dissertations and Discussions* (1874). "Bain has stepped beyond all his predecessors and has produced an exposition of the mind of the School of Locke and Hartley . . . which deserves to take rank as the foremost of its class, and as marking the most advanced point which the *a posteriori* psychology has reached." "Those who have the highest appreciation and the warmest admiration of his predecessors are likely to be the most struck with the great advance which this treatise (*The Senses and Intellect*) constitutes over what those predecessors had done, and the improved position in which it places their theory." "With analytic powers comparable to those of his most distinguished predecessors, he combines a range of appropriate knowledge still wider than theirs; having made a more accurate study than perhaps any previous psychologist of the whole round of physical sciences." The most important modification made by Bain in the doctrine of association was the introduction of a new element in mental development—the tendency to spontaneous movement. "He holds that the brain does not act solely in obedience to impulses, but is also a self-acting instrument; that the nervous influence which . . . excites the muscles into action is generated automatically in the brain itself; not, of course, lawlessly and without a cause, but under the organic stimulus of nutrition." His work is marked by a spirit of precise analysis and zealous accuracy. It represents the high-water mark of English associationism. Consult: Mill, *Dissertations and Discussions* (New York, 1874); Ribot, *Contemporary English Psychology* (New York, 1873).

BAIN, ALEXANDER (1810-77). A Scottish electrician. He was born in Scotland, but in 1837 removed to London as a journeyman.

Among his inventions were electrical clocks, an earth-battery (1843), an apparatus for registering the progress made by ships (1844), the electro-chemical telegraph (1846), and an electrical apparatus for playing musical instruments at a distance.

BAIN′BRIDGE. A town and county-seat of Decatur County, Ga., 235 miles west by south of Savannah, on the Flint River, and on the Plant System and other railroads (Map: Georgia, B 5). It is in a region which produces cotton and tobacco, and has brickyards, cooperage works, turpentine distilleries, iron-works, lumber-mills, etc. The Georgia Southern Military College is situated here. Population, in 1890, 1668; in 1900, 2641.

BAIN′BRIDGE, William (1774-1833). An American naval officer. He was born at Princeton, N. J., entered the merchant marine at the age of fifteen, became captain of a merchantman four years later, and in 1796, while in command of the *Hope*, was attacked by and defeated an English schooner, whose captain had attempted to impress some of the *Hope's* crew. On the organization of the navy in 1798, he became a lieutenant, and was placed in command of the schooner *Retaliation*. Later in the year he was captured off Guadaloupe by the French frigates *Volontier* and *Insurgente*. Being released after several weeks, he returned to the United States and made a report which caused the passage of the 'Retaliation Act' of 1798 against French subjects captured on the high seas. In March, 1800, he was raised to the rank of captain, and later in the year was sent with tribute to the Dey of Algiers, who compelled him to convey an embassy, under Algerian colors, to Constantinople. He next served as commander of the *Philadelphia* in the war against Tripoli (1801-05), capturing the Moorish frigate *Meshboha* (August 26, 1803); but running aground, he was himself captured in November, off Tripoli, where he and over 300 of his men were kept prisoners until the close of the war. Early in 1812 he was put in command, as commodore, of the *Constitution*, *Hornet*, and *Essex*, he himself being on the first; but soon afterwards the three vessels parted company, and on December 29, the *Constitution* met and captured the British frigate *Java*. (See Constitution, The.) In 1815 he was made commander of the squadron fitted out against Algiers, but the war was averted. In the same year he established in Boston the first training-school for naval officers, and afterwards for two years (1819-21) cruised in the Mediterranean. He subsequently served at the Philadelphia and Charlestown navy-yards, and from 1832 to 1835 acted as chief of the board of naval commissioners. He was a tall and powerful man, and was noted at once for his strong will and his remarkable tact. Consult Harris, *Life of Bainbridge* (Philadelphia, 1837).

BAINES, bānz, Edward (1774-1848). An English publicist, born at Walton-le-Dale. He was apprenticed to a printer at Preston, and afterwards at Leeds, and in 1801 bought the Leeds *Mercury*, which subsequently became one of the most important of the provincial newspapers. He was consulted on important questions by many Parliamentary leaders, and was elected, in 1834, to succeed Macaulay as a member for Leeds. Until 1841 he continued in Parliament as an independent Liberal. He advocated the separation of Church and State and the reform of factory laws, and opposed governmental interference in educational matters. He wrote a *History, Directory, and Gazetteer of the County of York* (1823), later enlarged as the *History of the County Palatine and Duchy of Lancaster;* and a *History of the Reign of George III.* (4 vols., 1823).

BAINES, Sir Edward (1800-90). An English politician. He was elected in 1859 to Parliament, where he became the champion of many reforms. He opposed Church tests in the universities, sought the disestablishment of the Irish Church, and in 1861 and 1864 presented bills for extending the electoral franchise. He wrote a *History of the Cotton Manufacture in Great Britain* (1835), and other works.

BAINI, bȧ-ē′nē, Giuseppe (1775-1844). A celebrated Italian composer, one of the most distinguished and scientific of modern times. He was born and died in Rome. A pupil of the Seminario Romano, and later of Jannaconi, he entered the Papal Choir in 1795, and in 1814 succeeded Jannaconi as chapelmaster. His numerous Church compositions are distinguished by religious austerity and severe classical profundity. His *Miserere* for ten voices was the only work of the Nineteenth Century deemed worthy to be performed at the Sistine Chapel, alternately with those of Allegri and Bai, during Holy Week. His best title to fame, however, rests upon his life of Palestrina, *Memorie storico-critiche della vita e delle opere di Giovanni Pierluigi da Palestrina* (2 vols., Rome, 1828; German translation by Kandler, with notes by Kiesewetter, 1834). It is the standard work on Palestrina, though strongly biased with regard to non-Italian composers.

BAIRAKTAR, bī′rȧk-tär′, or **BAIRAKDAR** ('standard-bearer'). The title of the energetic Grand Vizier, Mustapha (1755-1808). He was born of poor parents, but early distinguished himself by his bravery. He fought against the Russians as Pasha of Rustchuk in 1806. When Selim III. was deposed by the Janizaries in 1807, Bairaktar took the part of the dethroned Sultan, and after the murder of Selim in 1808, he deposed his successor, Mustapha IV., and elevated Mustapha's brother, Mahmoud II., to the throne. Bairaktar was now appointed Grand Vizier. In the exercise of this office, he deposed the Grand Mufti, the leader of the Janizaries, and all the ulemas who had taken any part in the late revolution; while, at the same time, he was careful to secure the tranquillity of the capital, and strengthened the regular army. His chief object was the annihilation of the Janizaries; but, like the unfortunate Selim, he fell a victim to that fierce band of soldiery. Favored by the more fanatical among the people, the Janizaries rebelled, and, with the support of the fleet, attacked the Seraglio on November 15, 1808, and demanded the restoration of Mustapha. Bairaktar defended himself bravely, but when he saw that the flames threatened to destroy the palace, and that he was in danger of falling alive into the hands of his enemies, he strangled Mustapha, threw his head to the besiegers, and then killed himself.

BAIRAM, bī-räm′ *or* bī′räm. See Beiram.

BAIRD, Absalom (1824—). An American soldier. He was born at Washington, Pa., graduated at West Point in 1849, served in 1850-51 as first lieutenant of artilery in the Seminole War, was assistant professor of mathematics at the Military Academy, in 1853-59, and from 1859 to 1861 was on garrison and frontier duty. During the Civil War he served in the Peninsular campaign, in Tennessee, and in the Atlanta campaign, and in 1865 was brevetted major-general U.S.A. In 1866-68 he was inspector-general of the Department of the Lakes; in 1868-70 of the Department of Dakota; in 1870-72 of the Division of the South; and in 1872-81, and in 1885, of the Division of the Missouri. From 1885 until he was retired in 1888, he was staff inspector-general, with the rank of brigadier-general.

BAIRD, Charles Washington (1828-87). A Presbyterian scholar. He was born at Princeton, N. J.; a son of Robert; graduated at the University of the City of New York (now New York University) in 1848, and at Union Theological Seminary in 1852; American Chaplain in Rome, 1852-54; pastor of a Reformed Dutch church in Brooklyn, 1859-61; after that time pastor of the Presbyterian Church at Rye, N. Y. He is the author of *Eutaxia, or the Presbyterian Liturgics* (New York, 1855); *A Book of Public Prayer* (1857); *A History of Rye* (New York, 1871); *Bedford Church* (1882); and especially *A History of the Huguenot Emigration to America* (New York, 1885, 2 vols.). Unhappily he did not live to carry out his plans for this extensive and valuable work.

BAIRD, Sir David (1757-1829). A British general. He was born December 6, 1757, at Newbyth, Scotland. He was left fatherless at an early age. His mother procured his entry to the army in 1772, as ensign in the Second Foot, and he joined his regiment at Gibraltar in 1773. In 1778 he received his lieutenancy, and in the same year, on account of his distinguished bearing and great height, was appointed by Lord Macleod, a family friend, to be captain of the Seventy-third Grenadier Regiment, afterwards famous as the Seventy-first Highland Light Infantry. He served in British India, 1780-89. In September, 1780, at Perambucum, heroically fighting against overwhelming odds, he was severely wounded, taken prisoner, and held captive by Hyder Ali. Released in March, 1784, he became, in 1787, major in his regiment, and in 1789 returned to England. In 1790 he purchased the lieutenant-coloncley of his regiment, but owing to the delay of his agent in this transaction, on two subsequent occasions lost the succession as commander-in-chief of the army. In 1791 he returned to India, and after some minor service, in 1799 led the storming party at Seringapatam, having obtained that perilous honor at his own urgent request, Colonel Wellesley (afterwards Duke of Wellington) commanding the reserve. His merit was acknowledged by the home Government. In the following year he was appointed to the command of an expedition against Batavia, which was, however, afterwards sent to Egypt. On his return to India, he found that the star of Wellesley was in the ascendant; and Baird, who had already complained of the preference given to that officer, and who was, besides, of opinion that his own merits were constantly overlooked, applied for leave of absence, and sailed for Europe in 1803. He was received at court with great distinction, knighted in June, 1804, and made a K.C.B. in the following August. In 1805 he commanded an expedition against the Dutch Settlements at the Cape of Good Hope, which was successful; in 1807 he commanded a division at the siege of Copenhagen; and in 1808 was sent to Spain with an army of 10,000 men to assist Sir John Moore. He distinguished himself in the battle of Corunna, January 16, 1809, when his left arm was shattered by grape-shot and had to be amputated. Moore was killed in the action, and Sir David succeeded to the chief command, and had the honor of communicating the intelligence of the victory to Government. On this occasion he received, for the fourth time in his life, the thanks of Parliament, and was created a baronet. He retired from active service in 1810, and was made commander of the forces in Ireland in 1820. He died August 18, 1829. Consult: Hook, *Life of General Sir David Baird* (London, 1832); Gore, *Character of Sir David Baird* (London, 1883).

BAIRD, Henry Carey (1825—). An American political economist, born at Bridesburg, Pa. He received an academic education. From 1845 to 1849 he was a member of the publishing-house of Carey & Baird, of Philadelphia, and in the latter year reorganized the firm as Henry Carey, Baird & Co. In politics he was first a Whig and then a Republican. In 1875 he became a leader of the Greenback party, which nominated him for State treasurer of Pennsylvania and for mayor of Philadelphia. The former nomination he declined. He also supports the free-silver cause and the Protectionists' doctrines. His publications include contributions to works of reference on banking, money, and economics, and similar discussions in periodicals. A collection of his works was published at Philadelphia in 1875.

BAIRD, Henry Martyn (1832—). An American historian and educator. He was born in Philadelphia; graduated at New York University in 1850; traveled in Greece and Italy; and from 1855 to 1859 was tutor at Princeton. In 1859 he became professor of the Greek language and literature in New York University. He is distinguished for his researches in the history of the Huguenots. Among his works are: *History of the Rise of the Huguenots in France* (1879); *The Huguenots and Henry of Navarre* (1886); *The Huguenots and the Revocation of the Edict of Nantes* (1895). These three works comprise, in six volumes, a succinct history of French Protestantism from 1512 to 1802, which has been admired by both American and Continental scholars as a model of thoroughness and judicial fairness.

BAIRD, Robert (1798-1863). An American clergyman and author. He was born in Fayette County, Pa., and graduated at Jefferson College in 1818. He passed several years in Europe, where he labored especially for temperance and the revival and consolidation of evangelical Protestantism. He was agent and secretary of the American and Foreign Christian Union. His works include: *A History of Temperance Societies in the United States* (1836); *A View of Religion in America* (1842); *Protestantism in*

Italy (1845); *History of the Albigenses, Waldenses, and Vaudois.*

BAIRD, SPENCER FULLERTON (1823-87). An American naturalist. He was born at Reading, Pa., February 3, 1823, of English and German parentage, and died at Woods Hole, Mass., August 19, 1887. He graduated from Dickinson College, Carlisle, Pa., in 1840, and in 1842 studied at the College of Physicians and Surgeons in New York City. During these earlier years he had formed valuable and influential acquaintanceships with Audubon and Agassiz, and other leaders of American zoölogy, in much of whose work he was a collaborator. In 1845 he was elected professor of the natural sciences in Dickinson College, but continued his original work. He became assistant secretary of the Smithsonian Institution in 1850, and entered upon his life-work. This was the period of an extensive exploration of the western half of the United States, and Baird had charge of the energetic efforts made under the direction of the Smithsonian Institution to carry on a scientific investigation coincident with the geographical exploration of that region, and of the formulation and publication of the results in the reports of the Pacific Railway surveys and elsewhere. He also stimulated private research and the deposit of objects in the care of the Smithsonian, thus laying the foundation of the National Museum, which was organized (1857) and developed by him. Upon the death of Joseph Henry in 1878, he became secretary of the Smithsonian, and still farther advanced its work and collections in the direction of zoölogy and American archæology. Meanwhile he had been urging the need of the investigation and conservation of the fishes and fisheries of the United States, and through his action Congress created in 1874 the Commission of Fish and Fisheries, appointing Professor Baird its first commissioner, an office which he retained until his death, and wherein he organized the entire science and practice of fish culture (q.v.) in the United States, and made it a model that has been widely copied in other countries.

In the dual relation which he sustained to two great branches of public scientific work, increased by his constant editing and writing for the press, Baird exerted an influence more extensive and stimulative than was exercised by any man of his time. He trained a large number of men who have reached great usefulness and fame in various departments of scientific and economic natural history, and is affectionately remembered by a great circle of students for his helpful kindness and encouragement. A complete bibliography of the titles of his works and papers to 1882 was compiled by G. Brown Goode and published as *Bulletin No. 20 of the United States National Museum* (Washington, 1883). It contains 1063 titles, to which the product of five more years is to be added. He edited the Smithsonian Reports from 1878, and several Reports of the United States Commission of Fish and Fisheries, to which he also contributed many special papers. Among the more important of his publications are: *Catalogue of North American Reptiles* (1853); *Birds of America* (with Cassin, 1860); *Mammals of North America* (1859); *History of American Birds* (with Brewer and Ridgway, 1874-84).

BAIREUTH, bī′roit. See BAYREUTH.

BAISCH, bīsh, HERMANN (1846-94). A German landscape-painter, born at Dresden. He studied at the Stuttgart Art School, and in 1868 went to Paris, where he was much influenced by the works of Dupré and Rousseau. In 1869 he became a pupil of Lier at Munich. Soon he made himself known for his landscapes, chiefly of the region about Munich. They are distinguished by careful observation, and subtlety of atmospheric effects. In 1880 he was appointed professor of landscape painting in the art school at Karlsruhe. His most prominent works are: "Mill by Moonlight" (Stuttgart Gallery); "Dutch Canal Landscape" (Dresden Gallery); "At the Watering-Trough" (Hanover Museum); and "Ebb-Tide near Dordrecht" (Berlin National Gallery).

BAIT, bīt. See BEIT.

BAITER, bī′tẽr, JOHANN GEORG (1801-77). A German philologist, born at Zürich. He studied at Munich, Göttingen, and Königsberg, was for some time professor in the University of Zürich, and from 1849 to 1865 rector of the Zürich Gymnasium. With Orelli and Winckelmann, he prepared a collective edition of the works of Plato (1839-42); with Sauppe one of the speeches of Lycurgus (1839-50); and he contributed the *Annales* (1858) to the second edition of Orelli's recension of Tacitus. He also published an edition of the *Fabellæ Iambicæ* of Babrius, then recently discovered (with Orelli, 1845), and edited the philosophical writings of Cicero for the Tauchnitz edition of the complete works of that author (1860-69).

BAIT′-FISHING. The second great subdivision of angling, which is again divisible into fresh-water fishing and salt-water fishing. For bait-fishing a stiff rod is required, varying in length and strength, as must the line, with the size and nature of the fish. In fresh-water fishing, the bait generally is sunk by attaching a split shot, or other lead sinker, about a foot above the hook, and a cork or quill float is attached to the line at a point which will allow it to float upon the surface of the water when the bait is at the desired depth. The bait varies, almost as much as does the fly in casting; for trout those commonly employed are worms, grasshoppers and minnows; for bass, minnows, the helgramite or dobson, crawfish, small frogs, grasshoppers, and crickets. For sea-fishing of the ordinary nature, where the fish are not expected to weigh more than two pounds, a stout rod 8 or 10 feet long, with 100 yards of No. 12 Cuttyhunk and a strong single gut-leader three feet long, a small float and 2-0 hooks, with shrimp or shedder crab bait, will be found effective. From the 2-pound bluefish up to the giant tarpon, which is occasionally yet caught by 'still-fishing,' bait-fishing passes through a wide variety.

Bait-casting is a variety of bait-fishing in which the sinker and float are discarded: as in angling for black bass the rod should be from 8 to 10 feet long, weigh not more than 8 ounces, and have a first-class multiplying reel attached. The minnow is hooked and reeled up to within a foot or two of the tip of the rod. Then, with the thumb pressing firmly on the spool of the reel, to prevent the rendering of the line, a steady sweeping motion is made, from below, upward, increasing in strength and swiftness until the arm and rod are fully extended. Just before the rod reaches its greatest elevation the thumb is released from the spool of the reel, and a final impulse given to the bait, which is propelled toward the objective point at an angle varying from 20 to 50 degrees, according to the distance to be cast. During the cast the thumb must keep a gentle but uniform pressure on the spool, to prevent back-lashing or over-running. When the bait reaches the aimed-at spot the reel is stopped by a stronger pressure of the thumb. See Angling; Fly-Casting; Trolling.

BAJA, bō′yō. A market-town of Hungary, in the county of Bács-Bodrog, near the Danube, about 90 miles south of Budapest (Map: Hungary, F 3). It has manufactures of alcohol and shoes, and carries on a large trade in grain, wine, and hogs. It is the chief river-port of the grain-producing district known as the Bácska. Population, in 1890, 19,500.

BAJADA DEL PARANÁ, bȧ-hä′dȧ dĕl pä′rȧ-nä′. See Paraná.

BAJ′AZET′. One of Racine's tragedies, founded on the life of the brother of Amurath, Bajazet I., Sultan of the Turks, 1389-1402. The plot hinges on the hero's choice between the throne and his mistress. The play was performed at Paris, on January 4, 1672. The character also occurs, with a change of episode, in Marlowe's *Tamburlaine* (1587), and in Rowe's *Tamerlane*, a tragedy performed in 1702.

BAJAZET, or **BAYEZID I.** (1347-1403). Sultan of the Turks from 1389 to 1402. He succeeded his father, Amurath I., who was killed on the battlefield of Kosovo. Immediately on ascending the throne he inaugurated his rule by strangling his younger brother, Yakub, lest he should dispute the succession. He conquered Bulgaria, and a part of Servia, Macedonia, and Thessaly, and subdued most of the States of Asia Minor. From the rapidity with which these extraordinary conquests were effected, he received the name of Ilderim, 'the Lightning.' At Nicopolis he gained a decisive victory over the allied Hungarians, Poles, and French, on September 28, 1396. The greater part of the French, through whose impetuosity the battle was lost, were taken prisoners and slain. In 1402 Bajazet led his army against Timur (q.v.), who had invaded Asia Minor, and was completely defeated by the Mongol ruler near Angora. Bajazet himself fell into the hands of the conqueror, who treated him with great generosity. The story that he was carried about imprisoned in a cage is without any historical foundation. Bajazet died in 1403, in the camp of Tamerlane. He was succeeded in the government by his sons, Solyman I., Musa, and Mohammed I., the last of whom became sole ruler in 1413. The reign of Bajazet was a period of great corruption, in which the people generally imitated the actions of the Sultan and his chief ministers. Consult Gibbon, *Decline and Fall of the Roman Empire*, Vol. VII. (London, 1900).

BAJAZET, or **BAYEZID II.** (1447-1513). Sultan of the Ottoman Empire from 1481 to 1512. He was the son of the Sultan Mohammed II., the conqueror of Constantinople. He engaged in continual wars with Poland, Venice, Egypt, and Persia, and strengthened the Ottoman power in Europe, though not without meeting frequent checks and reverses. His later years were disturbed by disputes among his sons about the succession to the throne. He died near Adrianople in 1513, shortly after abdicating in favor of his son Selim. He was a lover of luxury and splendor, and built several magnificent mosques in Adrianople and Constantinople. See Ottoman Empire.

BAJAZET, Mosque of. One of the many beautiful mosques erected by Bajazet II. (q.v.). It was built in 1505, at Constantinople, and still stands. Its court is surrounded by marble arcades, the capitals of which are of jasper, and contains an octagonal fountain in the centre. Four Persian doorways lead into the richly carved and decorated interior.

BAJ′IMONT'S ROLL. See Bagimont's Roll.

BAJOCCO, bȧ-yŏk′kō, or Baiocco, pl. Bajocchi (from *baio*, brown; so called from its brown-bay color). A copper coin in the Papal States, value nearly a half-penny. It was 1-100 of the scudo, which was equal to $1.00. In the Island of Sicily, the Neapolitan *grano*, the 1-100 part of the ducato (= $.83), was also called a bajocco.

BAJ′REE. See Guinea Corn.

BAJURA, bȧ-jo͞o′rȧ. The name of the banner of Mohammed.

BA′JUS, Michael—properly, De Bay (1513-89). One of the most distinguished theologians of the Roman Catholic Church in the Sixteenth Century. He was born in 1513, at Melin, Hainaut. He studied at Louvain, and became doctor and professor of theology there in 1550. He was present at the Council of Trent in 1563, and also in 1564. He was the founder of the system of theology based directly on the Bible and the writings of the Fathers and setting aside the scholastic method. He assumed to base his theory on the writings of Saint Augustine, whose doctrine of grace and free-will he sought to interpret into the entire inability of the human will to do good, and into the absence of merit in all good works. His position was vigorously assailed by the Jesuits as unorthodox. The assertions that the human will, so long as it is left to its own freedom, can do nothing but sin, and that even the mother of our Lord was not free from original and actual sin, together with other such doctrines, drew on him the accusation of heresy. Seventy-nine of his propositions were condemned by Pope Pius V., in 1567, in the bull *Ex Omnibus Afflictionibus*, but he was not named as the author of them. Bajus submitted in 1569, but nevertheless did not give up his doctrines. He retained his position, and was made chancellor of his university in 1575, but this did not shield him from the criticisms of his theological opponents. Gregory XIII. confirmed the condemnation in the bull *Provisionis Nostræ*, January 28, 1579, and Bajus was obliged a second time to make explanation. He died at Louvain, September 15, 1589, having earned the reputation of great learning, pure manners, and singular modesty. He may be regarded as the predecessor of the Jansenists, who inherited his Augustinian view, which was at that time termed Bajanism. His writings, mostly of a polemical nature, were published by Gerberon (2 vols., Cologne, 1696). Consult F. X. Linsenmann, *Michael Bajus und die Grundlegung des Jansenismus* (Tübingen, 1867).

BAJZA, boi′zŏ, József (1804-58). A Hungarian poet and critic, born at Szücsi, county of Heves, January 31, 1804. When barely twenty, he began contributing to Kisfaludy's *Aurora*, which has been called the cradle of modern Hungarian poetry, and which Bajza afterwards edited from 1830 to 1837. He was also editor of *Kritikai Lapok* ('Critical Leaves'), during 1830-36, and of the *Athenæum*, 1837-43; and these, together with Toldy's *Figyelmezö* ('Observer'), were the principal vehicles of his thoughtful essays and unsparing criticism, which exerted a strong and beneficent influence upon the rising Hungarian literature. His poems (Pesth, 1835) earned him a place among the best of his country's lyric poets. Through the publication of a series of foreign plays, and as director of the National Theatre at Pesth, he also gave valuable aid to the cultivation of a national drama. Later, his interests turned largely to history and bore fruit in an 'Historical Library' (*Történeti Könyvtár*, 6 vols., Pesth, 1843-45), containing translations from many excellent foreign works; and a compilation from the German, 'The New Plutarch' (*Uj Plutarch*, Pesth, 1845-47). After March, 1848, Kossuth appointed him editor of his semi-official organ, the *Kossuth Hirlapja* (May to December). He died March 3, 1858, from a brain disease, which had been slowly developing for eight years. His *Collected Works* have been edited by Toldy (6 vols., Pesth, 1861).

BAKACS, bŏ′kŏch, Tamás (?-1521). A Hungarian statesman and prelate, who was born about the middle of the Fifteenth Century. Though by birth a peasant, he became secretary to King Matthias Corvinus. He held various bishoprics, became Archbishop of Gran, and on the accession of Ladislaus II., was made chancellor of the kingdom, and later Cardinal-Primate of Hungary and Papal legate. He afterwards preached a crusade against the Turks; but his army of peasants and vagabonds turned their arms against the nobility, and a civil war ensued, accompanied by great cruelty on both sides, till it was ended by the rout of the insurgents by John Zápolya. Bakacs died in 1521, leaving an immense fortune.

BAKAIRI, bȧ-kä′ĭ-rê, or **BACCAHIRY**. A detached Caribbean tribe, living about the headwaters of the Xingú River, Central Brazil, remarkable for their light complexion and sexual taboos (q.v.). The men spend most of their time in assembly houses, which women are forbidden to enter. A woman, when asked her name, replies simply, "I am a woman."

BAKALAI, bȧ-kä′lī. A Bantu tribe on the Ogowe, French Equatorial Africa. They have been pushed to the west by the warlike Fans, losing their former skill as workers in iron and copper, and becoming traders. They number more than 100,000. Their religion is Mohammedan; learning is at a standstill. Consult Keane, *Ethnology* (Cambridge, 1896), and Deniker, *Races of Man* (London, 1900).

BAKAU, bȧ-kou′. The capital of a district of the same name in Moldavia, Rumania, on the Bistritza, 188 miles north of Bucharest, by rail (Map: Turkey in Europe, F 1). It has a gymnasium and some trade in agricultural products. Population, in 1899, 14,567, of whom 4000 were Jews.

BAKE, bä′ke, Jan (1787-1864). A distinguished Dutch philologist, born at Leyden, September 1, 1787. He held the professorship of Greek and Roman literature in the University of Leyden for the long period of forty-two years (1815-57). His first important publication was a valuable contribution to the literature on Posidonius (1810), and this was followed by a learned edition of Cleomedes (1820). In collaboration with Geel, Hamaker, and Peerlamp, he published the *Bibliotheca Critica Nova* (1825-31), and, independently, contributed various classical articles to the *Scholica Hypomnemata* (1837-62). He brought out critical editions of Cicero's *De Legibus* (1842); the rhetorical work of Apsines and of Longinus (1849); and Cicero's *De Oratore* (1863). He died March 26, 1864.

BAKEL, bȧ′kĕl′. A strongly fortified town, capital of the arrondissement of the same name, in the French Colony of Sénégal, northwest Africa, on the left bank of the Senegal River, northwest of Kayes (Map: Africa, C 3). Bakel has belonged to France since 1820, and was of great strategic importance in the wars with the natives. It is an important trading-post and the meeting-place of caravans from the interior. The trade is chiefly in dates, rice, beeves, ivory, and gold dust. During the rainy season it has direct navigation with Saint Louis on the coast. Population, in 1897, 3000.

BAK′ER, Sir Benjamin (1840—). An eminent British civil engineer, born in England. He designed the cylindrical ship that transported Cleopatra's Needle to America; planned with Sir John Fowler the great Forth Bridge; was engaged in other important engineering works; and wrote extensively on engineering subjects.

BAKER, Edward Dickinson (1811-61). An American soldier. He was born in England, but came to this country in 1816. He practiced law at Springfield, Ill., became prominent in politics, and was a member of the Illinois Legislature from 1837 to 1844, when he was elected to Congress. He resigned in 1846 to serve in the Mexican War, and commanded a brigade at the battle of Cerro Gordo. After the war he was again elected to Congress. He declined a renomination in 1850, and in 1851 settled in San Francisco, where he soon became the leader of the California Bar. Thence he went to Oregon, and was United States Senator from that State. When the Civil War began he raised a regiment in New York and Philadelphia. He declined a commission as brigadier-general, and was killed at Ball's Bluff while leading a desperate charge.

BAKER, FRANK (1841—). An American zoölogist and anthropologist, born at Pulaski, N. Y. He graduated at the Columbian University in 1880 (M.D.), took his master's degree at Georgetown University in 1883, and Ph.D. at the same institution in 1890. He became assistant superintendent of the Life-saving Service in 1889, and superintendent of the National Zoölogical Park at Washington in 1890. In 1883 he was appointed professor of anatomy in the Medical School of Georgetown University, and was elected vice-president of the American Association for the Advancement of Science in 1890.

BAKER, HENRY (1698-1774). An English naturalist. He was brought up to the bookselling business, but afterwards devoted himself to scientific studies, especially to botany and microscopy. In 1744 he received the Copley Medal from the Royal Society for his microscopic study of saline particles. Among his works may be mentioned: *The Microscope Made Easy* (1743); *Employment for the Microscope* (1764); and some poetical works.

BAKER, JOHN GILBERT (1834—). An English botanist. Born at Guisborough, England, he was educated at the schools of the Society of Friends at Ackworth and York. Later he became lecturer on botany at the London Hospital, and in 1856 he was appointed assistant curator at the Kew Herbarium. He has also been associate editor of the *Journal of Botany*. Baker has published several works of importance on systematic botany, among the more important of which are the following: *Synopsis Filicum* (London, 1883), which is a later edition of the work begun by J. D. Hooker under the same title in 1868, and which is a descriptive catalogue of all species of ferns known at that time; *Monograph of the British Roses* (1869); *Monograph of the Ferns of Brazil* (1870); *Flora of Mauritius and the Seychelles* (1877); *Flora of the English Lake District* (1885); *Handbook of the Fern Allies* (1887); *Handbook of the Amaryllidaceæ* (1888); and *Handbook of the Bromeliaceæ* (1889). A large number of shorter papers on botanical subjects have appeared in scientific journals. Baker was elected to the membership of the Royal and Linnæan societies, and has received honors from several scientific associations.

BAKER, Sir RICHARD (1568-1645). The author of the *Chronicle of the Kings of England*, a book long esteemed and quoted on all matters of English history by the country gentry. Addison makes his model squire, Sir Roger de Coverley, refer to it frequently. Baker was born in Kent, was educated at Oxford, and in 1603 was made a knight. About 1620 he married and settled in Oxfordshire, of which county he was made high sheriff; but he was soon after thrown into the Fleet Prison for debt, and here he wrote his *Chronicle*, first published in 1641, besides several pious works of less note. He died in prison, in great poverty.

BAKER, Sir SAMUEL WHITE (1821-93). An English traveler, explorer, and sportsman, born in London. He studied in England and Germany, and in 1848 established an agricultural colony at Newara Eliya, Ceylon, where he remained until 1855, and achieved much reputation as a hunter of big game. In 1859-60 he superintended the construction of a railway connecting the Danube with the Black Sea. In 1861 he set out from Cairo for the discovery of the source of the Nile. He first explored the Atbara, Setit, and other Nile tributaries of northern Abyssinia, added somewhat to geographical knowledge of the region, and demonstrated that to these tributaries the Nile sediment is due. Thence he (in 1862) proceeded up the Nile to Gondokoro, where he awaited the arrival of Speke and Grant, who had left Bagowayo in 1860, and the former of whom had discovered the Victoria Nyanza to be the true Nile source. Informed by Speke of another lake, said to be crossed by the Nile on the river's course to Gondokoro, he continued his journey amid the defiance of the slave-traders and the mutiny of his troops, and on March 14, 1864, discovered the Albert Nyanza. Thus, notwithstanding the inaccuracy of some of his observations, subsequently rectified by Stanley, he had finally cleared away the mystery from the Nile problem which, since Herodotus, had perplexed the world. In 1869-73, with the rank of pasha and major-general, he commanded an expedition sent out by the Khedive of Egypt for the suppression of the slave traffic, the establishment of regular trade, and the opening to commerce of the great equatorial lakes. Subsequently he explored and hunted in Cyprus, Syria, India, Japan, and the United States. He wrote: *The Rifle and the Hound in Ceylon* (1853); *Eight Years' Wanderings in Ceylon* (1855); *The Albert Nyanza* (1866); *Cast Up by the Sea* (1868); *Ismaïlia* (2 vols., 1874); *Wild Beasts and Their Ways* (1890); and other works. Consult the T. D. Murray and A. S. White *Memoir* (London, 1895).

BAKER, THOMAS (1656-1740). An English antiquary and author. He was born at Lanchester, Durham, and was educated at Saint John's College, Cambridge, where he soon became a fellow. As a non-juror he lost in 1690 the rectory of Long Newton, and in 1717 his fellowship, but spent the last fifty years of his life at Cambridge. He is known chiefly from his valuable manuscript collections, comprising 42 folio volumes, on the history and antiquities of the University of Cambridge. His history of Saint John's College was edited by Professor Mayor in 1867.

BAKER, VALENTINE (1825-87). An English soldier, known as Baker Pasha, brother of Sir Samuel White Baker. He served in the Kaffir War in 1853, received two medals for bravery in the Crimean War, and was promoted to colonel of the Tenth Hussars in 1860. He left

England in 1873 to explore the northeastern frontier of Persia, and described his journey in *Clouds in the East* (1876). In 1875 he was imprisoned and cashiered for insulting a lady in a railway carriage. He entered the service of the Sultan in 1877, took part in the Turko-Russian War as major-general unattached in Mehemet Ali's army, and wrote a history of that campaign, entitled *The War in Bulgaria* (2 vols., 1879). He was summoned to Cairo by the Khedive in 1882, and was appointed commander-in-chief of the Egyptian army. Ordered to Suakim after the defeat of Hicks Pasha (November, 1883), he was defeated near Tokar by a body of Osman Digna's troops in 1884. He then returned to England, and in 1885 was appointed to General Wolseley's staff; but Queen Victoria refused to ratify any appointment restoring him to the British Army. In 1887 he went again to Egypt, and died at Tel el-Kebir.

BAKER, William Mumford (1825-83). An American author, born in Washington. He graduated at Princeton, and was a Presbyterian pastor successively at Galveston and Austin, Tex., and at Newburyport and South Boston, Mass. Besides *Inside: A Chronicle of Secession* (1866), considered his most important work, he wrote a number of tales, including *The Virginians in Texas* (1878); *The New Timothy, His Majesty Myself* (1879); and *Blessed Saint Certainty* (1881).

BAKER, AND THE BAKER'S WIFE, The. Popular names for Louis XVI. and Marie Antoinette, because of their giving bread to the starving rioters who collected before the Palace of Versailles, October 6, 1789.

BAKER CITY. A city and county-seat of Baker County, Ore., 357 miles east by south of Portland, on the Powder River, and on the line of the Oregon Railroad and Navigation Company (Map: Oregon, H 5). It is in the centre of the eastern Oregon mining region, and has a considerable trade as a distributing point for this district, as well as an export trade in lumber, wool, live stock, and products of the mines. Gold-mining, lumbering, stock-raising, and agriculture are the leading industries, and manufacturing interests are represented by saw and planing mills, iron-works, brewery, brick-yards, etc. Among points of interest in or near the city are the opera-house, Masonic temple, natatorium, and several of the mines. Settled in 1860, Baker City was incorporated in 1872. Under a charter of 1898, the government is vested in a mayor, biennially elected, and a city council. There are municipal water-works. Population, in 1890, 2604; in 1900, 6663.

BAK'ERIES, Military. See Field Kitchen.

BAKER'S AN'TELOPE. A large antelope (*Hippotragus Bakeri*) of the Sudan, with horns of a massive type. It is pale liver-red, with penciled ears and some black stripes on the shoulders. It was named after its discoverer, Sir Samuel Baker.

BAKER'S DOZ'EN. The number thirteen instead of the usual twelve. The custom of using thirteen for a dozen is supposed to have originated when heavy fines were imposed for short weights, and the bakers in particular gave an extra unit to secure themselves against a possible short weight. The number thirteen has also been called the Devil's Dozen, referring in that case to the number of witches who assembled at each of their great festivals, and to the superstition that thirteen is an unlucky number. See Witchcraft.

BAK'ERSFIELD. A city and the county-seat of Kern County, Cal., 85 miles northwest of Los Angeles; on the Kern River, and on the Southern Pacific and the Atchison, Topeka, and Santa Fé railroads (Map: California, D 4). It has a public library and fine county buildings. The city controls important commercial interests as the centre of an oil, live-stock, and fruit-growing region; and contains foundries and machine-shops, refineries, planing and flouring mills, fruit and meat packing houses, tank factory, etc. Valuable electric power, derived from the Kern River, is utilized by the street railway, water and electric-light companies, and manufacturing industries, and in several irrigation plants for pumping purposes. Bakersfield was settled in 1872. Population, in 1880, 801; in 1890, 2626; in 1900, 4836.

BAKE'WELL (anciently, *Badecan-willan*, protected wells, from AS. *þeccan*, Ger. *decken*, to cover = *wella*, *wylla*, spring, Eng. well). A small but ancient town in Derbyshire, England, on the Wye, 25 miles northwest of Derby. It lies in the midst of beautiful scenery; in the vicinity are black marble and limestone quarries, and coal and lead mines. The celebrated Arkwright first established cotton-mills here. The town has chalybeate springs and warm baths, and a spacious old Gothic church. Three miles from the town is Chatsworth House, the seat of the Duke of Devonshire. Population, in 1891, 2791; in 1901, 2850.

BAKHMUT, bäk-mo͞ot'. The chief town of the district of the same name, in the Government of Yekaterinoslav, South Russia (Map: Russia, E 5). It lies in a hollow on the banks of the Bakhmut, a shallow affluent of the North Donetz River. In its immediate vicinity are deposits of salt, in purity and thickness of vein rivaling those of Bochnia and Wieliczka. A number of foreign companies exploit the mineral, from which they also manufacture soda. The region, within a radius of 60 to 80 miles, abounds in coal, both of the cheaper and the anthracite varieties. In the city salt is manufactured by the evaporating process from water drawn from wells. The product is accounted among the best in the world and is exported abroad. Among the industrial establishments are glass, fire-proof brick, lime, and cement factories; iron and flour mills and breweries. The town was settled in the Seventeenth Century, and was surrounded by a wooden wall in 1703; eighty years later it was promoted to the rank of chief town of the district. Population, in 1897, 19,400.

BAKHTCHISARAI, bäk'chê-sȧ-rī' (Pers., palace of gardens, from *bakhtcha*, garden, orchard + *sarāī*, palace, inn). The residence of the ancient princes or khans of the Crimea, situated in a narrow limestone valley about 20 miles from Simferopol, the capital of the Government of Taurida, Russia (Map: Russia, D 6). It is a typical Tartar town. It has 36 mosques, one Christian church, and two synagogues. In the centre of the city is the famous palace of Khan-Sarai. Built in 1519 by the Khan Abdul-Sakhal-Gerai, the magnificent palace, after years of decay, was restored to its former grandeur in 1787 by orders of Prince Potemkin. Of the other noteworthy buildings, the Mosque of the Khan is probably the most magnificent; it was erected in 1737 by the Khan Selamit-Gerai. In one of the old Jewish synagogues, a parchment roll of the Bible—the most ancient, according to some Hebrew scholars—was discovered. It is now in the Imperial Library. The principal articles of manufacture are the well-known red and yellow morocco leather, fur coats, boots and shoes, soap, candles, and some hardware. The town is a mart for the products of the neighboring country, such as tobacco, flax, grain, and especially fruits. Its population, principally Mohammedans, numbered (1897) 13,000, including 3000 Christians, 1000 Jews (mainly Karaites), and some Greeks.

BAKHTEGAN, bäᴋ′te-gän′. A salt lake of Persia, to the east of Shiraz, 74 miles long, and from 4 to 13 miles broad. Its altitude is 5100 feet above the sea. Large deposits of fine salt are gathered from its basin when the lake dries up in summer.

BAKHUIZEN VAN DEN BRINK, bäk′hoi-zen vän dân brĭnk, Reinier Cornelis (1810-65). A Dutch historian. He was born at Amsterdam February 28, 1810. Among his noteworthy achievements must be mentioned *Vondel met Roskam en Rommelpot* (new ed., 1891). *Variæ Lectiones Ex Historia Philosophiæ Antiquæ* (1842), *La Retraite de Charles Quint* (1842), and *Het huwelijk van Prins Willem met Anna van Saksen* (1853). He was in 1854 made keeper of the State archives, and published *Het Rijksarchief* (1857), and *Cartons voor de geschiedenis van den nederlandsche Vrijheidsoorlog* (1860-77). He died at The Hague July 15, 1865. Not the least of his services to Holland was his connection with *Gids*, a monthly publication of very high aim.

BAK′ING. The mode of cooking food in an air-tight chamber or oven. The term is also applied in the manufacture of bricks and pottery. The oven attached to kitchen-ranges for cooking is simply an iron chamber, with flues for conveying the heated gases of the fire round it. Ovens are now often heated by water, or by steam, and also by gas. The chemical as well as mechanical effect of cooking upon food is explained in the article on Cookery. The chemistry of bread-baking is discussed under Bread.

BAKING POW′DER. A chemically prepared material used as a substitute for yeast in making bread, biscuits, etc. Bicarbonate of soda and tartaric acid mixed with starch or flour are the materials from which the best baking powders are made. When water is added to these substances in making bread they combine and give off carbonic acid gas or carbon dioxide, exactly as does yeast by fermenting, which causes the bread to rise. Instead of bicarbonate of soda, bicarbonate of ammonia is sometimes used, and sometimes in place of tartaric acid alum is substituted to cheapen the cost of production. Investigation has shown the last substance to be objectionable, if not injurious, but there seems to be little objection to the use of bicarbonate of ammonia. See Bread.

BAKONY WALD, bŏ′kôn-y′ vält, or **BAKONY FOR′EST.** A chain of mountains in Hungary, extending northeastward from the neighborhood of Lake Balaton toward the bend of the Danube (Map: Hungary, F 3). It is about 60 miles long, over 20 miles in width, and densely covered with forests, on the mast of which numerous herds of swine are reared. Its average height is not over 2000 feet; the highest peaks are found on the western side. The lower parts of the chain are under cultivation; a considerable export trade is carried on in the excellent marble of several quarries, and there are numerous villages in the valleys. The railway line from Stuhlweissenburg to Komorn winds through the chain, reaching its highest point near Gombas (1220 feet).

BAKSHEESH, băk′shēsh′, or **BAKSHISH** (Pers. *bakhshish*, a present). In the East, in modern times, in special significance of gratuity (Ger. *Trinkgeld*), which, however, the Orientals do not quietly wait to receive, but demand loudly, and even insolently. Every traveler, whether in Turkey or in Egypt, in Asia Minor or in Syria, if he receives the smallest service from any one, is immediately reminded, by the cry of "Bakshish, Bakshish," to pay for the courtesy by a gift of money.

BAKU, bȧ-ko͞o′ (a corruption of the Pers. *badkubu*, given to it on account of the destructive winds of that region). The seat of administration of Russian Trans-Caucasia and an important seaport on the west coast of the Caspian Sea, on the Peninsula of Apsheron (Map: Russia, G 6). It is an important commercial and manufacturing centre, has several ship-building yards, is of great importance to Russia as a naval station, and is known especially for the rich petroleum wells in its neighborhood. In its architectural aspect, the city presents a combination of the Oriental and the European styles, and while certain portions of it wear the impress of antiquity, others, on the contrary, look very much like the modern commercial town. On the new quay, which is about a mile in length, along the shore south of the city, there are modern stores and bazaars, many fine buildings, and the ancient garden of the Khans. The older town, laid out in terraces, on the slope of a hill, has irregular, narrow streets and alleys lined with low, wooden, flat-roofed houses. Here are the ruins of the palace of the Khans—once a magnificent edifice built in the Mussulman style of the Fifteenth Century, and the Mosque of the Shah, erected in 1078. Close to the shore, near the strong wall of the old town, stands the 'Tower of the Maiden'—the subject of many poetical legends. North of the harbor, also on the shore, is still another part of Baku, the so-called 'Black Town,' whither the crude oil is conducted through pipe-lines from the oil-wells eight or nine miles north of the town, and where it is refined for the market.

The climate of Baku is rather mild, its harbor having frozen but once in eighty years. The city owes its prosperity to its petroleum, whose output has grown from 40,000 tons in 1860 to more than 9,000,000 in 1899. In addition to oil refineries there are a number of mills, tobacco factories, and chemical-works. The advantageous position of Baku, on the Caspian Sea near the Persian frontier and at the eastern terminus of the Trans-Caucasian Railway, has made it the entrepôt for the Russo-Persian trade. Cotton, rice, silk, wine, dried fruits, and walnut wood pass through Baku from Persia on their way to Russia and Western Europe, in exchange for various goods of Russian manufacture. The growth of Baku's population has kept pace with that of its industry. In 1860 it numbered only 13,800; in 1897, 112,000, or more than a sevenfold increase in less than forty years. The predominating element in the population of Baku is Tartar. This race constitutes the bulk of the laboring and small trading class of the community; the Russians are next in number, and fill the official positions as well as some of the commercial and financial posts; the Armenians are the most influential class, controlling the business of the city. The petroleum industry is largely in the hands of foreign capitalists.

Baku has been known under its present name since the Seventh Century, though founded at an earlier date. The easily igniting gases, arising from the soil saturated with petroleum, seem to have been known to the ancient Parsis, or fire-worshipers, and attracted great numbers of pilgrims. In the Eighth Century, Baku with the surrounding country was held by the Arabs; then it fell under the rule of the Khans of Shirvan, and from the Sixteenth till the Nineteenth Century was in the possession of the Persians. It finally passed to Russia in 1806, and was made the chief town of the district; in 1859 it became the seat of administration for the entire Trans-Caucasian territory. A vast conflagration took place here in 1901. Consult: Marvin, *The Region of Eternal Fire* (London, 1883); Louis, "The Baku Petroleum District," in the *Engineering Magazine*, No. XV. (New York, 1898).

BAKUNIN, bȧ-kōōn'yėn, MIKHAIL (1814-76). A Russian agitator and writer. He was a member of an aristocratic family, and after serving in the army from 1832 to 1838, traveled in Germany, where he devoted himself to the study of philosophy. His liberal tendencies had become marked even before he left Russia. In 1841 he was in close association with the leaders of the Young-German movement at Berlin, and in 1843 he appears as fraternizing with the Polish exiles in Paris. He passed a number of years in Switzerland, where he became prominent in communistic circles. In 1847 the Russian Government demanded his return to Russia, and, upon his refusal, confiscated his property. In the same year he was expelled from Paris upon the demand of the Russian authorities as the result of a violent speech in which he called upon the Poles and Russians to unite for the overthrow of the absolute monarchy. During the two years following he was plunged into the vortex of the revolutionary movement which was then convulsing all Europe. We find him at Berlin shortly after the outbreak of the March Revolution in 1848; in June of the same year he took part in the Pan-Slavic Congress at Prague and in the disturbances which followed, and in May, 1849, he was one of the leaders of the insurrection at Dresden, and became a member of the Revolutionary Government there. He was taken prisoner at Chemnitz, and was condemned to death in May, 1850, but the sentence was commuted to imprisonment for life. After passing through the hands of the Austrian authorities, Bakunin was handed over to the Russian officials, and was sent to Eastern Siberia in 1855. In 1860 he received permission to remove to the Amur region, whence he succeeded in making his escape on an American ship to Japan. Proceeding to London by way of the United States, he threw himself into the Socialistic movement, which was then making rapid progress under the leadership of Marx and Engels. In 1869 he founded the Social Democratic Alliance, which soon joined the International Workingmen's Association. By this time, however, he had become a believer in militant anarchism, and he attempted to impose his doctrines upon the association, whose policy was one of peaceful agitation. This led to his expulsion in 1872. In 1873 Bakunin retired from active life and spent the remainder of his days in Switzerland. He died at Bern July 1, 1876. A list of his writings, comprising mainly articles in newspapers and periodicals, covers ten printed pages in Nettlau's *Bibliographie de l'anarchie* (Paris, 1897).

BAKWIRI, bȧ-kwē'rē. A Bantu tribe of Kamerun, of medium height, well-proportioned, and with regular features. Cannibalism was formerly practiced. Drum-signaling is much used. The code admits of carrying on sustained conversations, and news is rapidly conveyed to long distances. Witchcraft, ordeals, and sacrifices prevail.

BALAAM, bā'l*a*m (Heb., destroyer). A seer; the hero of a remarkable story told in connection with the early history of the Hebrews, which on a critical analysis yields these results: The main narrative is to be found Num. xxii.-xxiv., but such references as Num. xxxi. 8, 16, and Josh. xiii. 22, many modern Biblical scholars think, make it evident that there was another tale current about Balaam quite different from the picturesque narrative of his vain endeavors to pronounce a curse upon Israel. According to such scholars, in the one narrative Balaam was a Midianitish counselor, who, because of his part in persuading his people to lead the Israelites into evil ways (cf. Num. xxv. 1-5), is killed in battle, together with the chiefs of Midian, while in the other and more commonly known narrative Balaam was a native of Mesopotamia, who, at the instance of Balak, King of Moab, leaves his home at Pethor, on the Euphrates, to pronounce a curse upon Israel. These scholars claim that the story rests upon the primitive belief which ascribed irresistible powers to the formulas, which were no doubt incantations, uttered by those supposed to be in close contact with the Deity. Balaam at first declined (xxii. 13), but on the second call God allowed Balaam to go. His instructions, however, were to speak only what God told him. Balak takes Balaam to Bamoth Baal, from which the edge of Israel's camp could be seen. At Balaam's order, seven altars were built, and seven oxen and seven rams offered. Then Balaam prophesies, but instead of cursing Israel, he blesses. A second and a third time

Balak builds altars and offers sacrifice, but each time Balaam blesses Israel. Balak chides him for this, but Balaam answers that he must obey the commands of God.

To these critical scholars the story is evidently compiled from several sources. They call attention to the repetitions in the narrative, and such contradictory statements as are implied in Num. xxii. 22, where God is said to be angry that Balaam went with the messengers of Balak, whereas, two verses previous, God gives the seer the order to go. According to one version, then, Balaam went at the express command of the Deity; according to the other, of his own initiative. The second version is introduced by the side of the first in order to bring in the episode of the talking ass. God manifests his displeasure at Balaam's consent to go to Balak by sending an adversary that is a hostile angel with drawn sword to block up Balaam's path. The ass sees the angel and tries to turn aside, but the adversary blocks the way both to the right and the left. The ass clings to the wall, and Balaam, not seeing the angel, thinks that the ass is obstinate, and beats him three times, whereupon the ass reproaches Balaam, to whose gaze now the sight of the angel is revealed. The angel addresses the seer, rebukes him likewise for maltreating the ass, and warns him not to speak anything but what God will command him. This episode places Balaam in a more unfavorable light than what has preceded, and thus by a continuation of the analysis of the texts we can pick out the several parts of the two (or more) versions from which the narrative has been pieced together. The poetical utterances in the narrative represent some of the finest specimens of Old Testament poetry.

BALAAM. The name under which the Earl of Huntingdon is satirized in Dryden's *Absalom and Achitophel.*

BAL'ACHONG (Malay *bālachān*). The name given by the Chinese to a condiment made of putrid shrimps or small fish pounded with salt and spices and then dried. It is eaten with rice.

BALAFRÉ, bȧ'lȧ'frȧ', Le (Fr., the scarred). (1) A name applied to Ludovic Lesly, uncle of Quentin, in Scott's *Quentin Durward*, because of his scarred cheek. (2) A characterization of two dukes of Guise for a similar reason.

BALAGUER, bä'lȧ-gār', Vittorio (1824-1901). A Spanish poet, historian, and diplomat; born at Barcelona. He served his native town as archivist, and afterwards was professor of history in the university there. He was made minister of public works in 1872, vice-president of the Cortes in 1880, and minister to the colonies in 1886. He made a special study of the history and legends of Catalonia. Among his more important works are: *Estudios históricos y politicos* (1876), *Historia de Cataluña* (1878), *Historia politica y literaria de los trovadores* (1878-80), *Tragedias* (1879), *Poesías completas* (1884).

BALAHISSAR, bä'lȧ-hĭs-sär' (Turk. and Ar. *bala*, high + *hissar*, castle). A village of Asiatic Turkey, situated about 8 miles southwest of Sivrihissar, in the vilayet of Angora (Map: Turkey in Asia, D 3). Near by are ruins of the ancient Pessinus, a flourishing town of Galatia, famous for the worship of Cybele, to whom a fine temple was built by the kings of Pergamum. Most of the remains of the acropolis, theatre, and hippodrome of the ancient city have disappeared.

BA'LAK. A caricature of Dr. Burnet, Bishop of Salisbury, in *Absalom and Achitophel*, by Dryden and Tate. He appears in Part II.

BALAKIREFF, bá-lä'kē-ryĕf, Mili Alexeyevich (1837—). A Russian composer and founder of the Young Russian School of Music. Ulybysheff (Oulibicheff) was his first teacher in music at his native city, Nizhni-Novgorod. Of exceptional memory, he knew at the age of 18 nearly all the classics of music by heart. In 1855 he graduated from the mathematical department of the University of Kazan and went to Saint Petersburg, where Glinka befriended him. He made a brilliant début as a pianist, but gave up that career; nor could Ulybysheff's Mozart-worship make a classicist of him. Russia was reawakening, after the Crimean war, from her enforced torpor during the reign of Nicholas I., and Balakireff gathered around him several youthful enthusiasts, Cui, Musorgski, and later Rimsky-Korsakoff and Borodin, all striving for nationalism in music, with Glinka and Dargomyzhski as their models. The foundation of the Modern Russian School was now laid. Under the energetic guidance of Balakireff, they studied all the masters of music from the earliest times. He possessed a striking power of analysis, as well as of imparting knowledge, and he taught them whatever he learned himself. "Truth and nationalism" was their battle-cry. At first in literary articles, then in musical compositions, they embodied their theories. Balakireff's own contributions to this movement were *Songs* (1858-60); three overtures (on Russian themes, 1858; on Czech themes, 1867; and the Millennial, 1862); incidental music (overture, march and four entr'actes) to *Lear* (1858-61); a collection of 40 *National Songs* (1866); and a piano fantasy, *Islamey* (1869). The songs have remained a classic in their national treatment of the added accompaniments, and the fantasy has been pronounced the most difficult piano composition. It was a favorite of Liszt's, and one which all his pupils had to learn. Jointly with Lomakin, Balakireff founded, in 1861, the *Free Music School.* In its classes the 'new truths' were inculcated, at its concerts the works of the Young Russian School were performed, under Balakireff's passionate baton. In 1867, he gained a European reputation by his production and conducting of Glinka's *Ruslan and Lyudmila* in Prague. On his return, he was elected conductor of the Russian Musical Society, but resigned in 1869, on account of intrigues, and in 1872 withdrew from public life owing to ill-health. From 1883 till 1894 he was director of the Imperial Capella, which he has placed on a solid musical foundation by organizing classes in various branches of musical instruction. His fantasy for orchestra, *Tamara* (1867-82), and his symphony in C major (1898) are his greatest works. They are glowing, passionate, and full of rich orchestration. All his larger works are programme music of the Berlioz-Liszt School. Though not prolific, he occupies, in the history of Russian music, one of the most distinguished places. Consult: Cui, *La musique en Russie* (Paris, 1880); Pougin, *Essai historique sur la musique en Russie* (Turin, 1897).

BALAKLAVA, bä′lȧ-klä′vȧ. A small port in the southwest of the Crimea. It is separated by a rocky peninsula from the harbor of Sebastopol, from which it is about six miles distant. The harbor, which affords secure anchorage for the largest ships, is perfectly landlocked, the entrance being so narrow as scarcely to admit more than one vessel at a time. To the east, overlooking the bay, are the ruins of a Genoese fortress, the foundation of which is pierced by numerous chambers and galleries. Balaklava is the Portus Symbolorum of the ancients, and the present name is supposed to be a corruption of the Italian *Bella-chiara* (fair haven). It was long the seat of a Greek colony. In the Fourteenth Century it fell into the hands of the Genoese, who were expelled in the Fifteenth Century by the Turks. On the acquisition of the Crimea by Catherine II. of Russia it was made a military station. In 1854 the town was occupied by the British, under Lord Raglan. Owing to the negligence and inefficiency of the commissariat the troops were subjected to extreme hardship, and great numbers of them perished of hunger and cold within touch of immense stores of supplies, rendered inaccessible by official red tape. On the heights between Balaklava and the Tchernaya, there was fought, October 25, 1854, a battle between the English and the Russians, signalized by splendid cavalry charges (the famous charges of the Heavy and Light Brigades) on the part of the former. Consult: Kinglake, *Invasion of the Crimea*, 8 vols. (London, 1863-1887), of which nearly the whole of the fourth volume is devoted to a minute account of the events connected with Balaklava; also Paget, *The Light Cavalry Brigade in the Crimea* (London, 1881).

BALA MURGHAB, bä′lȧ mōōr-gäb′. See MURGHAB.

BALAN, bȧ′län′. An early poem, a later rendering of which was *Fierabras*, one of the most popular tales of the Charlemagne cycle. An English version of *Balan* was *The Sowdan of Babylon*. In the latter romance, Balan is the name of the father of Fierabras. He was overcome by Charlemagne. The Arthurian character, Balan, was the brother of Balin.

BAL′ANCE (Lat. *bilanx*, having two scales, from *bis*, twice + *lanx*, plate). An instrument used for the comparison of two masses, or, speaking less technically, for ascertaining the weight of a body. The balance in its essence is simply a lever (q.v.) or beam poised or suspended so as to move freely about an axis transverse to its length. The force acting on one arm of the lever is produced by the action of gravity on the body whose weight is to be determined, and is equal to its mass *m* multiplied by *g*, the acceleration due to gravity. (See MECHANICS.) If the lever is in equilibrium, or the beam at a horizontal position, there must be a force equal, but opposite in direction, acting on the other arm at an equal distance, and as the acceleration due to gravity is a constant for any one point on the earth's surface, and as the arms of the lever are equal by construction, the mass of known magnitude upon which gravity acts must be equal to the mass of the unknown body. If the arms of the balance are unequal in length, it follows, from the law of the lever, that the masses are inversely as the length of the arms. The balance, accordingly, enables us to learn the actual mass of a body by direct comparison with a standard of mass. The spring balance (q.v.), on the other hand, measures the weight or attraction exerted by the earth on a body, and as the force of gravity varies from point to point, the force acting on the spring must vary with the place. The mass of the body which is being weighed is constant, so that the amount that the spring is stretched depends upon the acceleration due to gravity.

From the foregoing considerations it will readily be seen that there are two methods which may be followed in the construction of a balance: Either to make the arms equal in length, and then find the number of weights of known value which will produce equilibrium, as in the case of the ordinary balance; or by having a known constant weight whose position, and consequently the effective length of the arm on which it is suspended, can be varied at will, as in the case of the steelyard. These facts were early known, and the balance is one of the first instruments to be used for measurements, having been employed by the ancient Egyptians, as the accompanying illustration testifies, and by other nations of antiquity. The steelyard played an important part in the ordinary commercial transactions of the Romans, and interesting specimens of these balances and their weights have survived which show few if any important variations from the ordinary steelyard of the present.

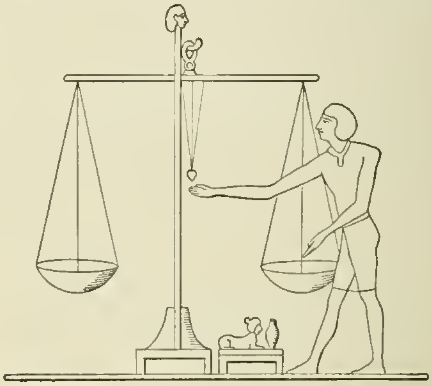


FIG. 1.

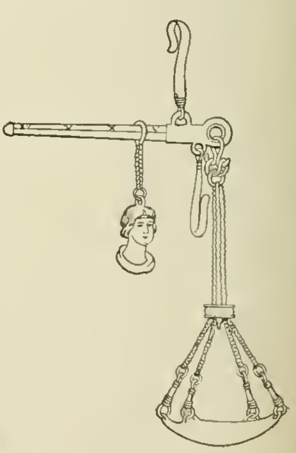


FIG. 2.—ROMAN STEELYARD.

Considering the simple balance, it is found that its first essential is that the arms should be equal, so that when once there is equilibrium the known and unknown weights may be interchanged without disturbing this condition. Otherwise the balance is false, and the weight obtained is not correct, being too great if the standard or known weights are placed in the short pan, and vice versa. Then, as it is necessary that the beam should move freely, there must be a proper mounting or suspension where friction is reduced to a minimum, and as the force of gravity acts vertically, both known and unknown weights must be carried in suitably suspended pans.

The balance is an instrument whose use is susceptible of great accuracy, and this is attained in the balances used by physicists and chemists in their measurements of precision. While the theoretical considerations involved are of course applicable to all forms of balances, they become of greater significance in discussing these finer instruments where extreme accuracy is desired. In such a balance the beam is of metal and carries at its middle point, transverse to its length, a steel or agate knife-edge which rests on surfaces of similar material. The line of contact between the knife-edge and the plane is the axis around which the beam revolves; and when the beam is at rest a vertical line through the centre of gravity would include this knife-edge. Connected with the beam, as shown in the illustration, Fig. 3, is a fine pointer, which passes over a graduated scale at the base of the supporting pillar, while at or near its extremities are placed, at equal distances from the central knife-edge, knife-edges upon whose sharp edges, turned upward, are placed the bearing surfaces of the metallic pieces from which the pans are suspended. In order that a minimum of wear should come upon these sharp edges, mechanism is provided to support the beam and pans whenever there is no actual weighing, and the devices to accomplish this vary in different forms of balances. The beam is graduated into 10 equal divisions, which in turn are similarly subdivided, and a hook on a movable rod is provided, by means of which a fine loop or rider of wire can be placed and removed at any desired point on the beam. Such is a general description of a balance, though there are, of course, numerous mechanical modifications and refinements to insure facility of operation and accuracy of measurement. The underlying principles will perhaps better be understood by referring to the diagram, Fig. 4. Let *ACB* represent the beam of a balance, and let the points where the knife-edges intersect a vertical plane through the beam be located on the line *ACB*, though this condition in practice is not always realized, and the knife-edges at the end of the beam may be either higher or lower than the centre knife-edge. The point of support is at *C*, consequently the centre of gravity is situated at *G* on a vertical line passing through this knife-edge. The location of the centre of gravity of the beam is an important consideration. If it were above the point of support the beam would be in unstable equilibrium, and would seek a more stable position, and in so doing would overturn. If the centre of gravity coincided with the axis of revolution, the beam would rest in any position indifferently, while the stability increases with the distance of the centre of gravity below the point of support. With an increase in the stability of the beam, the less the sensitiveness of the balance and the quicker the time in which it will cease from oscillating and take up a position of rest. The sensitiveness also depends on the length of the arms, increasing with the length, and the ease, or lack of friction resulting from skillful construction, with which the beam oscillates. The more sensitive, the balance the larger the period of oscillation of the beam, though it is necessary to consider the time necessary in making a weighing, and not adjust an ordinary balance to too high a degree of sensitiveness. An ordinary fine balance, as used by the physicist or chemist, is constructed and adjusted to have a period of vibration of between ten and fifteen seconds.

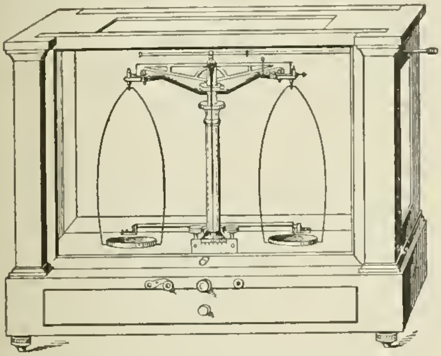


FIG. 3.—ANALYTICAL BALANCE.

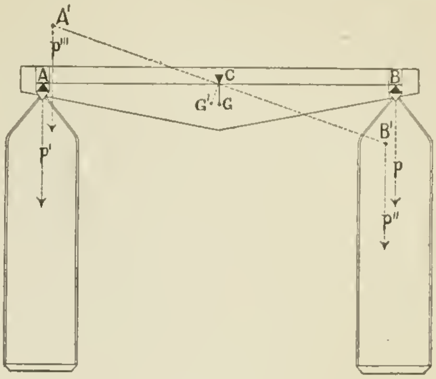


FIG. 4.

Assuming that the arms are equal in length and that equal loads are carried in each pan, or in other words that the beam is in equilibrium, the forces denoted by the dotted lines p and p', acting vertically, are of course equal. If now a small excess of weight be added to the right-hand pan, there will be an increased force on the right-hand arm, which may be represented by p'', and the beam will be deflected by an amount which for small additions of weight is proportional to the excess, and is of course indicated by the pointer and scale.

In using a fine balance, precautions must be observed in its care and manipulation. The balance, which is inclosed in a glass case and kept free from dust, is first leveled in order that the supporting pillar should be vertical. If the pointer of the balance is not at the middle point, or zero (many physicists prefer to renumber the scale so that the numbers run consecutively from the left to the right, instead of the usual arrangement where the divisions are numbered to right and left from the centre-mark), i.e. the zero or point of rest of the balance does not coincide with the zero of the scale, the true zero must be determined by taking the mean of an even number of swings on one side, and an odd number on the other, and then their mean. The body is placed in one of the pans while both pans and beam are supported. In the other are placed the weights, the usual practice being to begin with the larger weights and work toward the smaller. The weights are of brass, platinum, or aluminium, the smaller weights being in the form of pieces of sheet metal and 'riders' of fine wire. The pans and beams should always be supported while the weights are changed. After the approximate weight of the body is ascertained, so that the addition of a centigram will cause the pointer to come to rest on the opposite side of the scale, the 'rider' is brought into play and adjusted at such a position that the pointer comes to rest at zero. A more rapid and usual method is that known as 'weighing by swings,' where points of rest when the weights differ by a certain small unit are obtained as described above. The amount to be added to the smaller amount of the weights will be such a fraction of the small units as will be obtained by taking as the denominator the number of scale divisions between the two rest-points, and as the numerator the distance of the true zero from the first point. It is often convenient with such a balance to have a table of sensitiveness, from which one can tell at a glance the number of milligrams corresponding to a scale division for any given load. The experimenter can also find the ratio of the two arms of the balance and use it as a correction factor, as well as determine the errors of the set of weights in order to refine his measurement. He should, in addition, take into consideration the amount of air displaced by weights and the body being weighed, particularly if their densities differ considerably. An analytical or assay balance will have a sensitiveness of 1-50 or even 1-400 of a milligram, and is used in chemical analyses for the exact determination of the mass of various substances, though a sensitiveness of one-half milligram suffices for many ordinary analytical purposes. In the use of the balance there are many methods, complex and exact, which are used by the physicist, and which will be found described in the more advanced treatises on experimental physics.

Probably the most accurate use of the balance is at the International Bureau of Weights and Measures at Sèvres, near Paris, where the standard kilograms constructed by the bureau are preserved and compared. Here the balances are of great sensitiveness, and are operated by an observer in an adjoining room, who uses a telescope to observe the deflections. There is automatic apparatus to change the weights from one pan to another, and the temperature is maintained constant.

Balances are constructed in many forms for various purposes where it is not at all necessary to employ such refinements as have been described. Those of the apothecary or grocer are familiar examples, while the balance for weighing bullion combines large capacity with considerable sensitiveness. In small balances use is sometimes made of the bent lever, especially in balances for weighing letters, chemicals, and other small objects. Here a constant weight is placed on the short or bent arm, and the body of unknown mass on the long arm. A pointer on a graduated scale indicates the weight of the body. The graduations are not even, as the angular displacement from a position of equilibrium does not increase proportionately with the increase of weight.

Bibliography. For a description of ancient balances, consult Gerland and Traumüller, *Geschichte der physikalischen Experimentirkunst;* and Sokeland, "Ancient Desemers or Steelyards," in the *Smithsonian Annual Report for 1900* (Washington, 1901), translated from the *Verhandlungen der Berliner Gesellschaft für Ethnologie* (Berlin, 1900). For a description of the manipulation of a balance in fine measurements, the reader should consult Kohlrausch, *Leitfaden der praktischen Physik* (Leipzig, 1896), or his more elementary *Kleiner Leitfaden der praktischen Physik* (Leipzig, 1900); Stewart and Gee, *Lessons on Elementary Practical Physics,* Vol. I. (London, 1889), and Glazebrook and Shaw, *Practical Physics* (London and New York, 1893), give excellent descriptions of the theory and manipulation of balances, which also will be found discussed at considerable length in the larger treatises on practical physics. The publications of the International Bureau of Weights and Measures describe the method of testing standard kilograms and the balances used by the bureau.

BALANCE, and **BALANCE-SPRING.** The balance of a watch is a wheel finely poised on its axis; the pivot-holes in which it turns being frequently—in chronometers and clocks, as well as in watches—jeweled, or made of small rubies, diamonds, etc., for the sake of durability. The natural effect of an impulse given to such a wheel would be a complete rotation on its axis. This, however, is convertible, by the escapement (q.v.), and by the balance-spring, into a vibratory motion. The balance-spring is held to be a crowning invention in the mechanism of the watch; and the honor of its first suggestion has been claimed for no less than three very eminent men—Hooke, an Englishman; Abbé Hautefeuille, a Frenchman; and Huygens, the Dutch astronomer. The honor, however, is thought to belong to Hooke, who applied for a patent for the invention in 1658 or 1660.

The balance-spring consists of a coil of fine steel wire which determines the time of vibration of the balance. One of its extremities is fastened to a point independent of the balance, while the other is attached near its axis. When the balance is at rest, the spring is not under tension, its position being called the point of rest; but when an impulse is given to the balance by the crown-wheel of the escapement, the balance moves around just so far as the impulse given is able to overcome the elastic resistance of the spring. When that resistance becomes equal to the impulse given, the balance stops for a moment, and then is driven back by the elastic recoil of the spring, and continues thus to vibrate so long as the impulse is repeated or the watch is in motion. The subject of balances and balance-springs and their adjustment is treated at considerable length in Britten, *Watch and Clockmakers' Handbook* (London, 1896). For a general description of watchmaking and for illustration of the balance wheel, see Watch.

BALANCE OF POW'ER. An expression used in diplomacy, with reference especially to the European Powers, to denote a condition of affairs in which no one State is permitted to have such a preponderance as to endanger the independence of the others. This idea is not confined to modern times. The Greek States acted upon it by a kind of instinct of self-preservation, though it was not directly formulated. It has, however, been more distinctly avowed as a motive of political conduct, and more systematically acted upon since the time of Charles V., whose ambitious designs awakened the European Powers to the danger of such overwhelming preponderance in one dynasty. The motive of preserving the balance of power came first distinctly into the foreground in those alliances which England, Holland, and Austria repeatedly formed against the schemes of Louis XIV. It was the same cause that broke up the most powerful of these coalitions; for in the War of the Spanish Succession, when the Hapsburg candidate for the Spanish throne became, by the death of Joseph I., sovereign of Austria and Holy Roman Emperor, and the power which, in the hands of Charles V., had menaced the equilibrium of Europe, seemed likely again to be wielded by one man, England withdrew from the coalition, and saved Louis from a decided overthrow. The kaleidoscopic changes in political alliances that characterized European history from the Treaty of Utrecht to the end of the Seven Years' War, were the result of a frantic attempt on the part of Continental statesmen to preserve the balance of power. The aggressions of Napoleon called all the powers of Europe to arms against him in the name of the balance of power; and in readjusting the map of Europe the balance of power was often invoked to cover the jealousy which resisted claims to restitution of territory. For some time the balance of power in Europe has been embodied, as it were, in a hexarchy or permanent congress of the six great Powers—Great Britain, France, Germany, Austria, Russia, and Italy. Mutual jealousy among the leading Powers, on the score of extension of boundaries, is looked to as the great safeguard of the smaller States. After this manner the Crimean War arose out of Russia's renewed attempt to extend her dominion over Turkey. It was in the name of the balance of power that the nations, in 1878, at the Congress of Berlin, deprived Russia of many of the advantages she had gained by the Treaty of San Stefano. Within the last thirty years, however, the balance of power has encountered an opposing principle in the rising spirit of nationalism. It is now generally recognized that countries may no longer be carved arbitrarily into morsels for the sake of preserving a political equilibrium, but that physical and social conditions must be taken into consideration as forces playing a part in the formation of States. United Italy, United Germany, and the Pan-Slavic spirit in Russia exemplify the growth of this political idea. On the other hand, a new phase of the old problem has been presented by the spread of European colonization and commerce in Asia and Africa. The balance of power has been in a measure extended over the whole world, and France, Germany, and Italy are everywhere seeking colonies and 'spheres of influence' to balance the colonial empires of England and of Russia.

BALANCE OF TRADE. A term applied to the difference between the value of the exports and imports of a country. This difference was formerly measured roughly, by the outflow or inflow of the precious metals in the settlement of accounts. When the exports exceeded the imports, causing an inflow of the precious metals, the balance was deemed favorable; in the contrary case, unfavorable. All of these expressions, which are still familiar, had their origin in the conception of political economy dominant in the so-called mercantile period. (See article POLITICAL ECONOMY.) It was one of the fundamental errors of that system to confound the wealth of nations with their stocks of precious metals, and the economic policy of the period zealously favored anything which seemed to increase the stock of the precious metals, and as sweepingly condemned whatever had an opposite tendency. It will be readily understood how upon such principles the attainment of a favorable balance of trade became the chief end of commercial policy. Various measures were adopted to secure this end, and led to the manifold restrictions upon commerce which characterize peculiarly the Eighteenth Century.

With the spread of the notions of economic freedom and the gradual adoption of a more liberal if not an absolutely free-trade policy in commercial affairs, the 'balance of trade' lost its commanding place in economic doctrine. But it remained for a long time, and is to-day, a frequent popular criterion of national prosperity. Apart from the importance thus ascribed to the balance of trade there is doubtless the feeling that a nation which imports more than it exports must pay the excess from its accumulations, and thus gradually become impoverished. But if it be true that a people living upon its accumulations is on the road to impoverishment, it is by no means true that an excess of imports over exports is evidence of such a fact.

Whatever its bearing upon the national welfare, there could be no doubt that under the simpler conditions of a century ago an excess of merchandise exports over imports was an adequate explanation of an inflow of the precious metals. This would still be true if current sales and purchases were the only economic relations that bound peoples together. But this is far from being the case. In addition to movements of goods we have movements of debts (bonds, stocks, etc.), and movements of services (freights for transportation), between the nations. Any inequality in the movement of goods may be compensated, not only by payments of gold and silver, but by transfers of indebtedness or the performance of services. Indeed, the last two factors may be of such importance as to determine a movement of gold exactly contrary to what the merchandise movement might lead us to expect. Thus the United States, in the year ending June 30, 1900, with an excess of merchandise exports over imports of $544,541,898, exported $3,693,575 in gold. In the United States an excess of mercantile exports, and in Great Britain an excess of merchandise imports, may be said to be normal conditions of trade. Since it thus appears that the balance of merchandise exported and imported no longer explains the phenomena of international payments, the scope of the phrase 'balance of trade' has sometimes been extended to include the balance of international settlements. But in so doing the phrase once clear and distinct becomes involved and uncertain. It seems better to confine it to its original meaning to indicate one factor of modern commercial relations, and not the substance of them all.

It should be added that the practical determination of the balance of trade is beset with difficulties. Methods of determining the value of both exports and imports are necessarily crude, and it is not to be doubted that many of the false conclusions that have arisen in the discussion of trade balances have had their origin in the defects of commercial statistics. No analysis of trade returns can truthfully do more than indicate broad general tendencies without an examination into the methods by which such returns are prepared.

BALANGA, bȧ-län'gȧ. The capital of the Province of Bataan (1023 square miles; population, 52,000), on the island of Luzon, Philippines (Map: Luzon, D 8). It is on the western coast of Manila Bay, 34 miles from Manila. It has a post-office and a telegraph-station. Irrigation from the river Talisay is carried on to a considerable extent. Population, in 1898, 9000.

BAL'ANOGLOS'SUS (Gk. *βάλανος*, *balanos*, acorn, gland + *γλῶσσα*, *glōssa*, tongue). A remarkable worm-like invertebrate animal, now generally regarded as in some way related to the probable ancestral form of the vertebrates. Two or three genera form the sole family of the order Enteropneusta and the class Hemichorda (or Adelochorda). The body is long and slender, and, some distance in front of the middle, is banded by an elevated ring, called the collar, from the front of which springs the somewhat tongue-shaped proboscis. (See illustration on plate of ASCIDIANS, etc.) Back of the collar, on each side of the body, are series of vertical slits opening through both the body wall and the wall of the alimentary canal. Water taken into the mouth passes out through these openings and aerates the blood. The slits therefore function as gill-slits; and they are supported by 'chitinous' rods, like the gill-arches of Amphioxus. Projecting forward from the anterior upper side of the œsophagus is a short cartilaginous rod, which helps support the proboscis. This apparently corresponds to the notochord of the embryo of the higher vertebrates, and, because of its incomplete condition in Balanoglossus, the name Hemichorda is given to the class.

The species of Balanoglossus (and allied genera) are found buried in the sand of the seashore in shallow water in various parts of the world. They have been taken on both coasts of America, on the Pacific coast, north to Alaska, on the European side of the Mediterranean, in the East Indies, in the Bahamas, and on the south shore of Jamaica. Most of the known species are small and dull-colored, but some of the West Indian species are over a foot in length and half an inch in diameter, and are brightly colored with red and yellow. There are generally little heaps of excrement about the entrance to the holes in which Balanoglossus lives. All the species have a musky odor, which is strong enough to indicate their presence to any one familiar with the smell. Sometimes it is so strong as to be highly disagreeable. Many of the species have a complicated metamorphosis in their development, the pelagic bell-shaped larva being known as a tornaria. It resembles superficially the larval form of some of the echinoderms, and for that reason some zoölogists have sought for evidence of relationship between that group and the Hemichorda. It is generally believed now, however, that the nearest living relatives of the Hemichorda are to be looked for among the Ascidians. Compare AMPHIOXUS; and CHORDATA. For illustrations see ASCIDIANS.

BALAO, bȧ-lä'ō (Sp., to leap or dance). The name in the West Indies for the fishes of the family Hemiramphidæ, allied to the gars. See HALF-BEAK.

BALARAMA, bä'lȧ-rä'mȧ. The elder brother to Krishna in the Brahminical Pantheon. He is a spectator of the legendary war between the Pandavas and the Kauravas, which the great Hindu epic, the *Mahabharata*, recounts: and on several occasions he is restrained from interposing only by the influence of his younger but more powerful brother. He died shortly before Krishna, and is said, in the *Vaishnavas*, to have been one of Vishnu's many *avatars*.

BALARD, bȧ'lär', ANTOINE JÉRÔME (1802-76). A French chemist. He was born at Montpellier, and died in Paris. He began his career as a pharmacist, but was subsequently appointed professor of chemistry at the Sorbonne and at the Collège de France, Paris. In 1868 he was made Inspector-General of Superior Instruction. Balard carried out a number of interesting investigations both in pure and applied chemistry, but is best known as the discoverer of the element bromine, which he found in the mother-liquors remaining after the extraction of common salt from sea-water.

BAL'AS (Ar. *balakhsh*, a ruby from *Badakhshan*, *Balashan*, near Samarkand). The rose-red variety of ruby spinel, called also rubicelle.

BALASHOV, bȧl'ȧ-shôf'. The chief town of a district, in the Government of Saratov, Russia, on the left bank of the Khoper, a tributary of the Don, 170 miles west of the city of Saratov (Map: Russia, F 4). Balashov has a considerable trade, exporting grain and raw products. Population, in 1885, 10,100; in 1897, 12,200.

BALASORE, bäl'ȧ-sōr' (Turk. and Ar. *bala*, high + *sore*, dwelling). The capital of the district of the same name in the Orissa division, Bengal, British India, near the Burabalang, which enters the sea to the west of the Hugli or Calcutta River, 118 miles southwest of Calcutta (Map: India, E 4). It has dry-docks and a coasting trade, and was the seat, successively, of Portuguese, Dutch, and Danish factories. In 1846 the Danes sold their interest in the place to the English. Population, about 20,000.

BALATE, bȧ-lä'tȧ. The name in the Philippines for a local holothurian (*Holothuria atra*), which is a favorite sort of trepang. Consult Jordana y Morera, *Bosquejo geográfico e historico-natural del archipelago Filipino* (Madrid, 1885). See TREPANG.

BALATKA, bä'lät-kȧ, HANS (1828—). A musician, born in Hoffnungsthal, Moravia. He studied music in Vienna, and afterwards came to America, and settled in Milwaukee, where in 1851 he founded the Musikverein, which he conducted until 1860. He then became conductor of the Philharmonic Society of Chicago, where he organized the Liederkranz Society and the Mozart Club, and in 1888 became conductor of the Chicago Symphony Society. His compositions are chiefly songs and choruses.

BALATON, bŏ′lō-tŏn, Lake (Hung. for Ger. Plattensee). A lake, the largest in Hungary, about 55 miles southwest of Budapest (Map: Hungary, E 3). Its extreme length is 48 miles, with a breadth of from 3 to 10 miles, and an estimated area, including its frequently submerged marshes, of 420 square miles. Its greatest depth is 40 feet. It is fed by numerous streams and springs, and discharges its superfluous waters through the Sió, the Kapos River, and the Kapos Canal into the Danube. The southern bank is low, while the northern is bounded by vine-clad hills. The lake abounds in fish.

BALAUANG, bä′lou-äng′. A town of Luzon, Philippines, in the Province of La Unión, situated 22 miles north of San Fernando. Population, in 1898, 12,242.

BALAUS′TION'S ADVEN′TURES. A dramatic monologue by Robert Browning. The author's own fondness for Euripides is reflected in Balaustion's enthusiastic devotion to the humanest of the Greek tragedians. The Rhodian girl is one of the loveliest creations in English poetry. The poem was published in 1871, and was afterwards continued in *Aristophanes's Apology*. See Browning, Robert.

BALAWAT, bä′lȧ-wät′. A ruined city of Turkey in Asia, 10 miles northwest of Nimrud. The ancient colony of Baal in the kingdom of Assyria; its Arabic designation is Jaqut Balâbâdh. It is the site of a palace of King Asurnazirpal, and of his son, Shalmaneser II. Among the most interesting relics recovered from the ruins are the splendid bronze gates that opened into the vestibule. They are now in the British Museum. Consult Birch, *The Bronze Ornaments of the Palace Gates of Balawat* (London, 1880-81).

BALAYAN, bȧ-lä′yän. A seaport town of Luzon, Philippines, in the Province of Batangas (Map: Luzon, D 11). It is situated at the northwestern end of the Gulf of Balayan, 30 miles northwest of Batangas. Population, in 1898, 24,747.

BALBI, bäl′bē, Adriano (1782-1848). An Italian geographer. He published numerous works on geography and on statistics, most of which have been translated into the principal European languages. Among his works may be mentioned: *Prospetto politico-geografico dello stato attuale del globo* (1808); *Atlas ethnographique du globe* (1826); and *Abrégé de géographie* (1838).

BALBI, Gasparo. A Venetian merchant of the Sixteenth Century, the first traveler who left an account of India beyond the Ganges. He made a ten-years' visit to India. After his return he published, in 1590, the results of his travels in a volume entitled *Viaggio all' Indie Orientali*. A Latin translation was printed in De Bry's *Collection of Voyages and Travels to the East Indies*, published at Frankfort in 1590-94. Balbi appears to have set down, without exaggeration, all that he himself saw, and is particularly minute and exact concerning commercial matters; but there is scarcely any limit to his credulity with regard to what he heard from others. Having visited Goa and Cochin, and other Portuguese settlements, he sailed for Pegu, then an independent empire, where he remained two years. His account of this last country is the most interesting of his narratives.

BALBI′NUS, Decimus Cælius. One of the two emperors of Rome whom the Senate elected, on hearing of the death in Africa of the elder Gordianus and his son, in opposition to Maximinus, who had the support of the legions in Germany. He was celebrated as an orator and a poet, and was a man of mild disposition. His coadjutor, Marcus Clodius Pupienus Maximus (see Pupienus), was a bold and resolute soldier, who had risen from the people. They had reigned only a few months, during which time Maximinus had been killed by his own soldiers, who afterwards submitted to Maximus, when they were both killed in A.D. 238 by the Pretorians, who at that time were animated by bitter hostility toward civilians, and extended it to the rulers who had been elected by them.

BALBO, bäl′bō, Cesare, Count (1789-1853). An Italian statesman and historian, born at Turin. At the age of 18 he was appointed by Napoleon auditor of the Council of State at Paris; in the following year he became secretary to the commission sent to organize the Province of Tuscany, and continued for several years in similar service until the downfall of Napoleon. Thereafter he cast in his fortunes with the House of Savoy, and entered upon a military career; but this also was soon interrupted by his being unjustly implicated in the Revolution of 1821. After three years of exile in France, he returned home and gave himself up to historical studies. In 1843 appeared his *Delle speranze d'Italia*, whose chief contention was that national independence must precede the enjoyment of constitutional liberty. After freedom of the press was secured in 1847, he founded the *Risorgimento*, in conjunction with Cavour. In 1848 he became president of the first constitutional ministry of Piedmont, and from that time until his death, in 1853, retained a seat in the Chamber as one of the representatives of Turin. His ideal was Italian unity and independence, so far as was consistent with the maintenance of the Papal power, and this idea dominates all his writings. The more important of these include: *Storia d'Italia sotto ai Barbari* (1830); *Vita di Dante* (1839); *Meditazioni Storiche* (1842); and the posthumous works, *Della monarchia rappresentativa in Italia* (1857); *Sommario della Storia d'Italia* (1862). The best *Life* of Balbo is by Ricotti (Florence, 1856).

BALBOA, bȧl-bō̅′ä, Vasco Nuñez de (1475-1517). A Spanish explorer, the first European to see the Pacific Ocean from American shores. He was born of a noble but reduced family at Xeres de los Caballeros. After leading a rather dissolute life in his youth, he took part in the great mercantile expedition of Rodrigo de Bastidas to the New World. He established himself in Santo Domingo, and began to cultivate the soil; but fortune proved adverse, and in order to escape from his creditors, he had himself smuggled in a cask on board a ship, and joined the expedition to Darien in 1510, commanded by Martin Fernandez de Enciso. An insurrection which took place obtained for Balboa the supreme command in the new colony. Confused accounts which reached him of a great Western ocean impelled him, in 1513, to set out in quest of it. On September 25 of that year he obtained the first sight of the Pacific Ocean from a mountain-top in the Isthmus of Panama. On the 29th he reached the water at the point which is still known by the name he gave to it, the Gulf of San Miguel, and took formal possession for Spain, naming the ocean the *Mar del Sur*, or South Sea, the coast at this point trending nearly east and west. His natural enthusiasm at this great discovery was shared by all the educated men of his time, and the descriptions of it by contemporary authors may still be read with much interest.

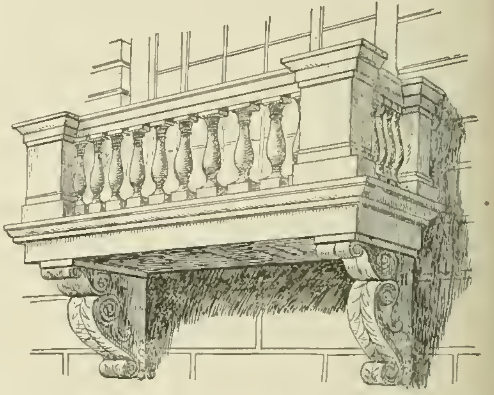
The governorship of the territories conquered by Balboa was obtained in 1514 by Pedrarias Davila, by means of his intrigues at the Spanish Court. Balboa resigned the command into the hands of the Governor, a narrow-minded and cruel man, and in a subordinate situation undertook many successful expeditions; but these, and all his other merits, only served to increase the hatred of Pedrarias Davila toward him. The Government of the mother country sought in vain to mediate between them, and Balboa even arranged to marry the daughter of Pedrarias. But on the first occasion of dispute which arose, Balboa, having been induced by Pedrarias to deliver himself up, was accused of a design to rebel, and upon evidence furnished by Garabito, the supposed friend to whom Balboa had intrusted his affairs, he was convicted and beheaded at Acla in 1517

BALBRIG'GAN (Gæl., Brecon's town, from *baile*, *bally*, place, town, fort). A seaport town of County Dublin, Ireland, 22 miles north of Dublin (Map: Ireland, E 3). Its principal manufactures are embroidered muslins, cotton, calico, and stockings. The cotton stockings made here are remarkable for fineness of texture and beauty of open work, and the name Balbriggan has been used to describe varieties of cotton-knit goods prepared elsewhere. Balbriggan is a favorite watering-place. After the battle of the Boyne, William III. encamped here. Population, about 2500.

BAL'BUS, Lucius Cornelius. (1) Maior. A native of Gades (Cadiz), in Spain. After serving in the war against Sertorius he came to Rome and received the citizenship. He was on terms of intimate friendship with Pompey and Cæsar, and was chosen to look after Cæsar's property and interests during the latter's Gallic campaigns. Under Octavianus he was made consul (B.C. 40)—the first time this honor had ever been conferred on one not born a Roman citizen. (2) Minor. A nephew of the above. He served under Cæsar in Spain, and was rewarded with the position of pontifex. As questor in Spain, under Asinius Pollio, he used his office for fraud and oppression. Years later we find him as governor in Africa, where he defeated the Garamantes and obtained a Roman triumph—a new honor for one not born a Roman citizen.

BALCH, ba̤lch, George Beall (1821—). An American naval officer, born in Tennessee. He entered the navy in 1837, studied at the naval school in Philadelphia in 1841-43, and participated in most of the naval operations of the Mexican War In 1862 he was promoted to be commander, and subsequently, in command successively of the *Pocahontas* and the *Pawnee*, of the South Atlantic blockading squadron, distinguished himself by his operations on the Black and Stone rivers (Tenn.), and Togoda Creek (S. C.). He was commissioned captain in 1866, commodore in 1872, and rear-admiral in 1878; was superintendent of the United States Naval Academy from 1879 to 1881, and was retired in 1883.

BALCONY, băl'kô-nĭ (It. *balcone*, from *balco*, scaffold, Ger. *Balken*, beam). (1) A projecting platform in front of a window or of several windows on the outside of a private or public building, inclosed by a balustrade or parapet, and supported either by consoles and brackets or by supports rising from the ground. The balcony was occasionally used in Græco-Roman architecture, as is shown by a house in Pompeii, by a temple at Baiæ, by ancient frescoes and reliefs, and by literary descriptions of the *mæniana* of Roman houses, but it did not become popular until the Middle Ages in the Orient and southern Europe.



A VENETIAN BALCONY.

Early wooden examples have perished; the finest remaining ones are the stone balconies in Italy, both in the communal palaces, where they served for public speeches and announcements (often called *ringhiera*), and in private palaces, such as those of Venice. In Italy they were usually uncovered, but sometimes, especially in France, they were surmounted by canopies, supported either on brackets or on columns rising from the balcony. Renaissance architects made an important feature of the balcony. In northern Europe, especially Switzerland and Germany, the structure was usually of wood, and became a most picturesque part of houses and chatelets. In modern times, especially, the balcony is made of iron, often artistic, when it is wrought, but is usually commonplace and a detriment rather than an addition. (2) The term is also applied to the gallery or stern-walk outside of the stern of a large ship, and in theatres to the part between the dress-circle and the gallery. See Building; and Architecture.

BALDACHIN, băl dȧ-kĭn (It. *baldacchino*, a canopy, from *baldacco*, the Italian name of *Bagdad*, where the fabrics were manufactured). A term borrowed from the East, and originally used of rich silks or brocades in the form of a canopy or tent-like or umbrella-like covering, such as were used in the East, either to place or carry over the heads of dignitaries or to pitch as tents. They formed an indispensable part of the court and traveling equipment of Byzantine and Mohammedan rulers and magnates, and were among the most sumptuous presents interchanged (e.g. that sent by Harun-el-Raschid to Charlemagne). Baldachins became well known in Europe, through the Italian trade with Constantinople and the Mohammedan East, and also through the crusades. Supported on four poles, they were carried over the heads of civil and religious dignitaries in all processions, coronations, marriages, religious rites, etc., and this custom is still continued in the processions of the Catholic and Greek churches. Fixed baldachins were used in royal and feudal throne-rooms, in Papal and episcopal halls, and over State tribunals: the term is also used for the canopies over State bedsteads. During the Renaissance, when the more purely architectural forms of the canopies over high altars, side altars, tombs, etc., were superseded by others of more pictorial type, the term 'baldachin' was applied to these permanent structures of marble or metal, such as Bernini's famous bronze baldachin over the high altar of Saint Peter's in Rome.

BALD COOT, BALD EAGLE, ETC. See COOT; EAGLE; etc.

BALD CY′PRESS. See CYPRESS.

BALDE, bäl′dȧ, JAKOB (1604-68). A poet, native of Alsace, who wrote in Latin. He was a Jesuit, and for a time professor of rhetoric at Ingolstadt and court preacher at Munich. He excelled as a lyric poet, and was especially successful as an imitator of Horace. Of his poems the following deserve mention: *Lyricorum Libri IV.*, *Epodon Liber I.* (1643); *Sylvæ Lyricæ* (1643); *Urania Victrix* (1663)—an allegory.

BALDER, bạl′dẽr. A narrative poem by Sydney Dobell, written at Amberley Hill in 1853, and published in 1854. Its plot is singularly painful, and it abounds in monotonous descriptions. It evinces, however, a lofty imagination and a fine appreciation of nature.

BALDER, bạl′dẽr (Old Norse *baldr*, AS. *bealdor*, OHG. *balder*, prince, lord; cf. OHG. *bald*, bold, Old Norse *ballr*, bold, impudent). In Scandinavian mythology, the son of Odin and Frigg, symbol of summer, light, beauty, amiability, persuasive eloquence, and gracious wisdom. According to the *Gylfeginning* (see EDDA) he lived at Brejdablik. The *Voluspá* tells a story of his death suggesting the myths of Adonis and Persephone. Here Balder is killed by the evil god, Loki, aiming for the blind god, Hödur, an arrow of mistletoe (symbol of mid-winter). He was the first of the *Æsir* to die. Hel, the goddess of the underworld, promised to release Balder, if heaven and earth unanimously asked it. Loki, as Thökt, refused, and escaped vengeance. But Balder will return after Ragnarök, the Twilight of the Gods, and usher in a golden age. Use has been made of this myth by Richard Wagner, in his Nibelungen tetralogy. See SCANDINAVIAN AND TEUTONIC MYTHOLOGY.

BALDER DEAD. (1) A dramatic poem by the Danish writer, Johannes Ewald, published in 1773. (2) A stately and pathetic narrative poem by Matthew Arnold, founded on the death and funeral of the Norse god and his journey to the underworld, where he was held in honor. See BALDER.

BALDERSTONE, bạl′dẽr-stōn′, CALEB. A faithful old butler in the family of the Master of Ravenswood, in Scott's *Bride of Lammermoor.*

BALDI, bäl′dē, BERNARDINO (1553-1617). An Italian savant and poet. He is said to have been master of a dozen languages, and to have written upward of 100 different works. He became tutor to Ferrante Gonzaga, through whom he was made Abbot of Guastalla, an office which he held for 25 years. He was famous as a theologian, mathematician, geographer, antiquarian, historian, and poet. He devoted 12 years to the work of which the *Cronica dei matematici* is an abridgment, and also wrote *La Nautica*, a poem on navigation, an Arabic grammar and dictionary, and a translation of the *Targum* of Onkelos. For his biography, consult Affò, *Vita di Bernardino Baldi* (Parma, 1783).

BALD′NESS. Absence of hair upon the scalp, or loss of hair already grown. The term *alopecia* is often used synonymously with the term baldness, but strictly speaking should not be applied to lack of hair that is congenital. Entire absence of development of the hair is termed congenital baldness, or *hypotrichosis congenita*. Senile baldness is termed *calvities* or *calvitium*. Pincus is authority for the statement that the life of a hair is from two to six years, at the end of which time it falls and is replaced by new growth. According to this calculation, from 50 to 60 hairs are shed each day. During vigorous health and until the prime of life has been passed, enough new hairs grow to replace the dead ones, and baldness does not occur. Baldness occurring at 40 or 50 years of age is called premature alopecia, and is due to disease. A frequent cause of baldness in the young is seborrhœic eczema of the scalp, which is characterized by increased formation of dandruff, and is of bacterial origin. It occurs as early as the eighteenth year. In the absence of this cause, baldness in young men has been ascribed to the effects of the lead used in preparing the 'sweat-leather' which lines the hat where it touches the head. Anemia, wasting diseases, such as fevers, child-bearing, and debility due to dissipation, are all ascribed as causes of baldness. It is also hereditary in certain families, and in such cases appears to be due to failure in the nutrition of the scalp. Women are less liable to baldness than men—a fact probably due to the circumstance that they take better care of the hair, wet it less often, and less frequently exhaust the natural oil of the sebaceous glands of the scalp by the use of strong alkaline shampoos. Syphilis and favus (q.v.) cause baldness in both sexes. Shaving the head, when the hair falls in great quantity, was once thought of advantage; but the wearing of a wig impedes the growth of the hair upon a shaven scalp. Chloral, ointment of mercury, cantharides, sulphur, tar, and resorcin, are used with success in checking baldness in some cases. Consult: Kaposi, *Diseases of the Skin* (Eng. trans., New York, 1895); Unna, in *Archiv für Dermatologie und Syphilis* (1882).

BALDO, bäl′dō, MONTE (It., bold mountain). A mountain in Lombardy, Italy, between Lake Garda and the Adige. Its highest peaks are the

Cima de Val Dritta (7275 feet) and the Monte Maggiore (7210 feet), on the southern side, and the Altissimo (6790 feet), on the north. It is composed of Jurassic strata, with basaltic intrusions.

BALD'PATE', or Baldhead. (1) An American white-headed duck. See Widgeon. (2) A kind of domestic pigeon. (3) In the West Indies, a dove (*Columba leucocephala*). (4) A fruit-crow (q.v.).

BALDRIC, ba̤l'drĭk, or Baudrick (Fr. *baudrier*, from MGH. *balderich*, girdle). A band or sash worn partly as a military and partly as a heraldic symbol. It passes round the waist as a girdle, or passes over the left shoulder, and is brought down obliquely under the right arm, or is suspended from the right shoulder in such a way as to sustain a sword. Many of the effigies of knights contain representations of the baldric, more frequently as a belt than a shoulder-sash.

BALDUNG, bäl'dụng, Hans (Grün) (c.1476-1545). A German painter and engraver, born at Gmünd, Swabia. He was a contemporary of Albert Dürer, by whom he was greatly influenced, and to whom, in expression, coloring, and finish, he was little inferior as a painter. He worked at Freiburg and in Switzerland, and in 1533 settled at Strassburg. His masterpiece, a great altarpiece in eleven panels (1511-16), descriptive of the life of Christ, is in the cathedral of Freiburg. His wood engravings are numerous.

BALD'WIN. A city in Douglas County, Kan., 16 miles south of Lawrence; on the Atchison, Topeka, and Santa Fé Railroad (Map: Kansas, G 3). It is the seat of Baker University (M. E.), founded 1858. Near the city is the battle-field of Black Jack, the scene of the first bloodshed in the slavery strife, preliminary to the Civil War. Baldwin was settled in 1853, and was incorporated about 1858. Its charter provides for a mayor, elected annually, and a city council. Population, in 1890, 935; in 1900, 1017.

BALDWIN, Baldouin, or Balduin. The name of several members of the House of Flanders, who reigned as Kings of Jerusalem during the period of the Crusades. Baldwin I. (1058-1118) was King of Jerusalem after 1100. He was the youngest brother of Godfrey de Bouillon (q.v.), Duke of Lower Lorraine, or Brabant. He took part in the first Crusade, quarreled with Tancred, retired to Edessa at the request of the Christian inhabitants of the place, and was soon after created Count of Edessa. After the death of his brother Godfrey, in 1100, he became Protector of the Holy Sepulchre and Baron of Jerusalem, and immediately assumed the regal title, which his brother had refused. He was defeated by an invading force from Egypt in 1102. He made some conquests, including Cæsarea, Acre, and Sidon. He died in Egypt. Unlike his brother Godfrey, Baldwin was worldly and ambitious.—Baldwin II. (Baldwin du Bourg), cousin of Baldwin I., succeeded the latter as Count of Edessa, and in 1118 as King of Jerusalem, reigning until 1131. During his reign Tyre was taken, in 1124, with the assistance of a Venetian fleet, and the Order of the Templars was instituted. He was held in captivity by the Turks for six months. He died August 21, 1131, leaving four daughters. Shortly before his death he resigned the crown in favor of his son-in-law, Fulk of Anjou, who reigned till 1142.—Baldwin III. (1129-1162), the son and successor of Fulk of Anjou, was King of Jerusalem after 1143. He has come down to us in tradition as a model of crusading chivalry. The Christians lost Edessa during his reign. He several times defeated Nureddin, Sultan of Aleppo. He endeavored to improve the external and internal defenses of his kingdom. Saracens are said to have served under him, so much was he respected. He married Theodora, the daughter of the Greek Emperor Manuel, and died, it is believed, of poison, at Tripolis, in Syria, February 10, 1162. His reign marked the height of power of the Latin Kingdom of Jerusalem. He was succeeded in the Government by his brother Amalric, or Amaury, who died in 1173.—Baldwin IV., the son and successor of Amalric, surnamed the Leper, reigned till 1183.—Baldwin V., a child of five, the son of Sibylla, sister of Baldwin IV., was then called to the throne. He died in 1186, a year before Jerusalem was retaken by Saladin. Consult: Gibbon, *Decline and Fall of the Roman Empire;* Cox, *History of the Crusades* (New York, 1889); also references under Crusades.

BALDWIN I. (1171-c.1206). The first Latin Emperor of Constantinople. He was born at Valenciennes, the son of Baldwin VIII., Count of Flanders and Hainault. In 1195 he succeeded his father as Count of Flanders. In 1200 he appointed his brother Philip to the regency of Hainault and Flanders, and joined the Fourth Crusade. Part of the Crusaders—Baldwin I. among others—were induced to assist the Venetians in reconquering Zara, in Dalmatia, from the King of Hungary. While at Zara the young Alexius, son of Isaac II., Emperor of Constantinople, asked the assistance of the Crusaders against his uncle, Alexius Angelus, who had deposed and blinded Isaac II., and had usurped the throne. In return for their aid he promised to pay the Crusaders a liberal sum of money, to help them recover Palestine, and to effect the union of the Greek Church with the Roman. The Crusaders agreed, defeated the usurper's forces, and restored the rightful emperor; but when Alexius experienced some difficulty in carrying out his promises they turned their arms against him. A revolution broke out in the city at the same time. Alexius the Younger was murdered, and his father died soon after. Alexius Ducas Murzuflos then usurped the throne, but was defeated by the Crusaders, and Constantinople was sacked, the Latins and the Venetians sharing the booty. Baldwin was chosen emperor, and crowned on May 9, 1204; but he received only about a fourth part of the Empire—Constantinople and Thrace—the Venetians obtaining the greater share of the provinces. A part also fell to the French adventurers who accompanied the expedition, and several provinces remained in the hands of Greek princes. The capacities of Baldwin I. were not able to cope with the evils necessarily attending so anomalous a position. The Greeks were discontented, and, backed by Calo-John, King of Bulgaria, took advantage of the absence of Baldwin I.'s brother with the flower of his troops in Asia, and rose and massacred the Latins scattered throughout the towns of Thrace, and made themselves masters of Adrianople. Baldwin laid siege to the town with the forces he had at his disposal, but was defeated and taken prisoner, April 14, 1205, by the Bulgarian king, and probably died about a year after (1206) in captivity. The facts about his death were never known. In 1225 a usurper attempted to pass himself off for Baldwin, and thus obtain Flanders. Baldwin I. was succeeded by his brother Henry. Consult: Pears, *Fall of Constantinople* (London, 1885); Gibbon, *Decline and Fall of the Roman Empire*, new ed. Vol. VI. (London, 1898).

BALDWIN II. (1217-73). The last Latin Emperor of Constantinople, from 1239 to 1261. He was the son of Peter II. (de Courtenay), and the nephew of Baldwin I. When his brother Robert died, in 1228, Baldwin was too young to rule, and an agreement was made with John of Brienne, who had been King of Jerusalem, by which Baldwin was to marry John's second daughter, and John was to be emperor until his death. John died March 23, 1237, but as Baldwin was in Western Europe he was not crowned emperor until December, 1239. His reign was disastrous. He spent much of the time in the West, seeking aid in the defense of his capital. In order to obtain money he sold to Saint Louis of France some of the most sacred relics at Constantinople, to hold which Louis built the Sainte Chapelle at Paris. On the night of July 25 or 26, 1261, his capital was taken by one of the generals of Michæl Palæologus, ruler of Nicæa, and Baldwin fled to Italy. With him terminated the Latin Empire in the East. Consult Gibbon, *Decline and Fall of the Roman Empire*, new ed., Vol. VI. (London, 1898).

BALDWIN, Count. The opinionated father of Biron (q.v.) and Carlos in Southerne's tragedy, *The Fatal Marriage* (q.v.). He cuts off Biron from his inheritance, ousts Biron's wife from his house, and thus becomes the cause of the whole tragedy.

BALDWIN, Abraham (1754-1807). An American statesman. He was born at Guilford, Conn., and graduated at Yale in 1772. In 1777 he entered the army as chaplain, and served until the close of the Revolutionary War, when he removed to Savannah, Ga. In 1784 he was sent to the State Legislature, and from 1786 to 1788 was a delegate to the Continental Congress. He was a prominent member of the Constitutional Convention of 1787, and as such cast an important vote, leading to a compromise, the result of which was the creation of the United States Senate. He was a member of Congress from 1789 to 1799, and was United States Senator from 1799 until his death, serving in 1801 and 1802 as president *pro tem.* In 1802 he was one of the three Georgia commissioners who negotiated the cession to the Federal Government of a large part of the State's western lands. He conceived the plan of the University of Georgia, obtained a charter for it, and from 1786 to 1801 served as its first president.

BALDWIN, Charles H. (1822-88). An American naval officer, born in New York City. He entered the navy in 1839, served as midshipman during the Mexican War, and became a lieutenant in 1853. He resigned in the following year, but reëntered the service in 1861, and in 1862 commanded the *Clifton*, of the mortar flotilla under Farragut, at Forts Jackson and Saint Philip. In 1869 he was appointed captain, and in 1883 was promoted to be rear-admiral, commanding the Mediterranean Squadron. He was retired in 1884.

BALDWIN, Evelyn Briggs (1862—). An American Arctic explorer, born at Springfield, Mo. He studied at Northwestern College (Naperville, Ill.), and taught in the public schools of Kansas in 1887-91. In 1892 he was appointed observer in the United States Weather Bureau. Subsequently he became an inspector-at-large in the United States Signal Corps. In 1893-94 he was meteorologist of the Peary Expedition to North Greenland, and in a similar capacity accompanied in 1898-99 the Walter Wellman Expedition to Franz-Josef Land. He discovered and explored Graham Bell Land in May, 1899. In 1901 he organized the Baldwin-Ziegler Expedition, sailing under his command for the discovery of the North Pole by way of Franz-Josef Land. The expedition returned in 1902, having deposited several caches of provisions in Franz-Josef Land. Baldwin wrote for periodicals several articles dealing with Arctic life.

BALDWIN, James (1841—). An American author and compiler, born in Hamilton County, Ind. He was for a time superintendent of schools at Huntington, Ind.; in 1887-90 was connected with the educational department of Harper & Bros., New York, and from 1890 to 1893 was assistant editor of *Harper's Magazine.* From 1893 to 1900 he was school-book editor for the American Book Company. His publications number *Six Centuries of English Poetry* (New York, 1892); *The Famous Allegories* (ib., 1893); *Old Greek Stories* (ib., 1895); *The Horse Fair* (ib., 1895); and *Four Great Americans* (Chicago, 1896).

BALDWIN, James Mark (1861—). An American psychologist, born at Columbia, S. C. He graduated at Princeton in 1884; studied at Leipzig, Berlin, and Tübingen; was instructor in German at Princeton in 1886-87, and professor of philosophy at Lake Forest University (Ill.) in 1887-89. From 1889 to 1893 he was professor of philosophy at the University of Toronto, Canada, and in the latter year was appointed to the chair of psychology at Princeton. In 1892 he was vice-president of the International Congress of Psychology, London, and in 1897-98 was president of the American Psychological Association. He is a prominent advocate of experimental psychology, to whose problems he has made original contributions concerning illusions, organic selection, reaction-time, and other subjects. With Professor Cattell, of Columbia, he founded the *Psychological Review.* He is editor-in-chief of the *Dictionary of Philosophy and Psychology* (1901). Among his other publications are: *A Handbook of Psychology*, 2 vols. (1888); *Elements of Psychology* (1893); *Social and Ethical Interpretations in Mental Development* (1897), translated into French and German, his most important work; and *The Story of the Mind* (1898).

BALDWIN, John Denison (1810-83). An American journalist, born at North Stoughton, Conn. He was self-educated, studied law and theology, and for several years after 1833 was pastor of a church at North Bradford, Conn. He was editor successively of the *Charter Oak*, a Hartford newspaper, the *Boston Commonwealth*, and the *Worcester Spy;* was three times chosen member of Congress, and wrote extensively for the magazines on archæological and kindred subjects. He published *Raymond Hill*, a volume of poems (1847); *Prehistoric Nations* (1869); and *Ancient America* (1874).

BALDWIN, Joseph G. (1815-64). An American humorist. He was born near Winchester, Va., studied law, removed to Mississippi, then to Alabama, where he succeeded in law, politics, and literature. In 1854 he went to California, and was judge of the Supreme Court of that State, 1858-62. His best-known early publications are his racy *Flush Times in Alabama and Mississippi* (1853), and *Party Leaders* (1855). The latter contains judicial estimates of Southern statesmen. He died in San Francisco. A volume of humorous legal sketches was published posthumously in San Francisco in 1879. Consult Mallers, in *Sewanee Review* (April, 1901).

BALDWIN, Robert (1804-58). A Canadian statesman, born at Toronto. He was admitted to the bar in 1825, was elected as a Liberal to the Assembly of Upper Canada, and this election having been declared void on petition, he was reëlected in 1830. In 1836 he visited England in the interest of responsible government for Canada. He was sworn of the Executive Council in 1836, under the government of Sir Francis Head, but with the other members resigned soon afterwards, and in 1840 became Solicitor-General for Upper Canada. In 1842-43 and 1848-51 he was Premier and Attorney-General of Upper Canada. He is so frequently referred to as the founder of the Reform Party in Canadian politics that it perhaps needs to be stated that his views approximated more nearly to those of the Liberal-Conservatives of a later time than to those of subsequent stages of the Reform party.

BALDWIN, Simeon Eben (1840—). An American jurist and educator, born at New Haven, Conn. He graduated in 1861 at Yale, was admitted to the bar in 1863, and in 1869 was appointed an instructor in the Yale Law School. He became professor of constitutional law in 1872, and in 1893 associate judge of the State Supreme Court of Errors. He was elected president of the American Bar Association in 1890, president of the American Social Science Association in 1897, and president of the International Law Association in 1899. He was a member of the commission appointed in 1872 by the State to revise the laws on education, and of that appointed in 1873 to revise the General Statutes. His publications, in addition to monographs and contributions to periodicals, include *Digest of the Decisions in the Connecticut Law Reports* (2 vols., 1872, 1882), and *Modern Political Institutions* (Boston, 1898).

BÂLE, bäl. See Basel.

BALE, John (1495-1563). Bishop of Ossory, in Ireland, born in the village of Cove, Suffolk, Eng., November 21, 1495. He was educated as a Carmelite monk at Cambridge, but afterwards turned Protestant, became rector at Thornden, in Suffolk, and being persecuted by the Roman Catholics, fled to Flanders (1540), where he remained eight years, during which he wrote numerous works. He was recalled by Edward VI., and successively presented to the living of Bishopstoke, in Hampshire, and the bishopric of Ossory (1552). In this latter sphere he made himself so obnoxious to the Roman Catholics by his zeal in the Protestant cause, that on news of the death of Edward (1553) his house was attacked and five of his servants killed. He himself escaped out of the country, after great difficulty and heavy loss, and came finally to Basel. On the accession of Elizabeth (1559), he returned to England, and was made a prebendary in the cathedral of Canterbury, where he died in November, 1563. His chief work was first published in 1548 under the title of *Illustrium Majoris Britanniæ Scriptorum Catalogus hoc est Angliæ, Cambriæ, et Scotiæ Summarium*, a history of English literature. His *Select Works* were published by the Parker Society, with a biography (Cambridge, 1849). He was the author of many treatises and several scriptural plays.

BALEARIC (băl'ē-ăr'ĭk) **CRANE.** See Crane.

BALEARIC ISLES. A group of five islands—Malorca (Majorca), Minorca, Iviza, Formentera, and Cabrera—which constitute a province of Spain. They lie off the coast of Valencia, in the Mediterranean, in latitude 38° 4′ to 40° 5′ N., and longitude 1° to 5° E. (Map: Spain, G 3). They have a total area of 1860 square miles and a population of (1887) 312,593; (1897) 306,926. The climate is healthful and temperate. The soil generally is good. Vines, olives, and other fruit trees are cultivated abundantly. The coasts are precipitous, with some excellent harbors—Port Mahon, in Minorca, being one of the finest in Europe. The Balearic Isles were taken possession of by the Carthaginians at an early date, and after the destruction of Carthage fell into the hands of the Romans. They were taken by the Saracens in 798, and became a separate kingdom in 1009. In 1232 the Moors were expelled from the islands by King James I. of Aragon, and from 1276 the islands formed the independent kingdom of Malorca until they were annexed to Aragon in 1343. The capital is Palma (q.v.), on Majorca. Consult: Vuillier, *The Forgotten Isles* (New York, 1896); Harrasowsky, "Les Baléares," in the *Revue de géographie*, Vol. XLIV. (Paris, 1899).

BALECHOU, bä'lä'shōō', Jean Joseph Nicolas (c.1719-64). A noted French engraver. He was born at Arles; was a pupil of Michel and Lépicié, and justly attained a very high reputation. His style has perhaps never been surpassed for boldness and finish of execution, but his drawing is often inaccurate. His best work is the full-length portrait of Augustus III., King of Poland, after the original by Rigaud in the Dresden Gallery. He also engraved a "Sainte Geneviève," after Vanloo, and three plates after Vernet.

BALEEN' (Fr. *baleine*, Lat. *balena*, whale). Whalebone in its original state in the mouth of a baleen whale. See Whale.

BALEN, bä'lĕn, Hendrik van (1575-1632). A Flemish painter. He was born at Antwerp, and was the pupil of Adam van Noort, the teacher of Rubens. He finished his studies in Italy, and became instructor of Van Dyck and Snyders. Later he was much influenced by Rubens, and even by Van Dyck. He excelled in small figures, especially in mythological subjects. Some of his altarpieces are in the Antwerp Cathedral and Museum, and among his other works may be mentioned "The Banquet of the Gods," in the Louvre.

BALESTIER, băl'ĕs-tēr', Wolcott (1861-91). An American journalist, publisher, and author, born at Rochester, N. Y. He studied at Cornell University and the University of Virginia, and in New York City was editor of *Tid Bits*, a humorous weekly, whose name was afterwards changed to *Time*. In 1889 he became junior member of the firm of Heinemann & Balestier, of London and Leipzig. His publications include: *A Patent Philtre* (1884); *A Fair Device* (1884); a campaign life of James G. Blaine (1884); *A Victorious Defeat* (1886); *A Common Story* (1891); with Rudyard Kipling (his brother-in-law), *The Naulahka* (1892); and *Benefits Forgot*, in the *Century Magazine* (New York, 1893).

BALESTRA, bä-lĕs'trä, Antonio (1666-1740). An Italian engraver and painter, born at Verona. He was a pupil of Antonio Bellucci at Venice, and of Carlo Maratti at Rome, and in 1694 gained the prize at the Academy of Saint Luke. Though nominally of the Venetian School, he was for the most part an eclectic. His paintings are of unequal merit: they are found chiefly in the churches of Verona, Venice, and Padua. He also executed some skillful engravings from his own designs.

BALFE, bălf, Michael William (1808-70). A popular English composer of operas. He was born May 15, 1808, in Dublin. His musical talent received early culture, and several anecdotes are related of his singular precocity. When only 7 years old, he played in public one of Viotti's concertos for the violin. At 9 he wrote the ballad entitled "The Lover's Mistake," which achieved popularity through the singing of Madame Vestris. At 16 he made his début in London as a violinist, in the Drury Lane Orchestra. In 1825 he went to Italy, where he studied counterpoint under Federici at Rome, and singing under Filippo Galli at Milan, and began his successful career as a composer, with music for the ballet *La Pérouse*, performed at La Scala, in Milan. In 1827 he sang in the Italian Opera at Paris with Malibran and Sontag, and gained great applause and many warm friends. He however returned to Italy, and devoted himself to composition, producing in rapid succession some thirty operas, of which the most popular are: *The Bohemian Girl* (1843); *The Rose of Castile* (1857); *Satanella* (1858); and the posthumous *Il Talismano* (1874), his most serious effort. Balfe lacks depth, serious musical discipline, and individuality; his style is a mixture of English-ballad sentimentality and the Italian manner of the Rossinian period. But his gift of simple melody, his strong comic vein, his facility of writing, his peculiarly English half-spoken, half-sung dialogue, and his feeling for effect have won for him a prominent place among English composers. He died at Rowney Abbey, Hertfordshire, October 20, 1870. Consult: C. L. Kenney, *Memoir* (London, 1875); and W. A. Barrett, *Balfe: His Life and Work* (London, 1882).

BALFOUR, băl'fōōr *or* băl'fẽr, Arthur James (1848—). An English statesman. He was born July 25, 1848, and studied at Eton and Cambridge. From 1878 to 1880 he held the office of private secretary to his uncle, the Marquis of Salisbury, Minister of Foreign Affairs, and was present at the Congress of Berlin. He represented Hertford in the House of Commons in 1874-85, and Manchester from 1886. Always a stanch Conservative, Balfour was appointed to the presidency of the Local Government Board in 1885: in 1886 he became Secretary of State for Scotland, and in 1887, Chief Secretary for Ireland. Under the second and third Salisbury administrations, he was First Lord of the Treasury and Government leader of the House of Commons, and in 1893 led the opposition against Gladstone's Home-Rule Bill. During Lord Salisbury's absence in 1898, through illness, Balfour was at the head of foreign affairs; and in July, 1902, on Lord Salisbury's resignation, he was made premier.

When his political career began, it was fashionable to regard him as a dilettante, a mere literary man, with no genius for practical work; and his first parliamentary prominence was as a member of the irresponsible group of four led by Lord Randolph Churchill and known as the 'Fourth Party.' His appointment to the Irish secretaryship, the most difficult administrative post in the Government, surprised every one; but his conduct of the office won the praise even of his most decided opponents. Despite his lack of enthusiasm and passion, and a turn for sarcasm not always restrained, he made one of the most popular leaders the House of Commons ever had. In his philosophic writings the naturally skeptical bent of his mind is clearly displayed; he is one to whom disbelief, or a contemptuous suspension of judgment, comes more easily than faith. As a writer, his highest merits are subtlety and originality—a directness of thought, a freshness of point of view, which make his work powerful, though his style has few technical merits, and though Spencer and others whose conclusions he impugns have accused his dialectic of sophistry. His works are *A Defense of Philosophic Doubt* (1879); *Essays and Addresses* (1893); *The Foundations of Belief* (1895; new ed. 1900).

BALFOUR, Francis Maitland (1851-82). A Scotch embryologist, born at Edinburgh; brother of the Rt. Hon. A. J. Balfour. He graduated in 1873 at Trinity College, Cambridge. In 1876 he was appointed lecturer on, and (1882) professor of, animal morphology. His publications are: *The Development of Elasmobranch Fishes* (1878), made up largely of the results of original research conducted at Cambridge and at the Stazione Zoölogica of Naples; and *A Text-book of Comparative Embryology* (2 vols., 1880-81), in great part an original work, distinguished alike for profound learning and clear statement. He was killed, with his guide, on July 19, 1882, during either the ascent or descent of the Aiguille Blanche de Penteret, Switzerland.

BALFOUR, Gerald William (1853—). A Conservative member of Parliament for Central Leeds, England, since 1885. He was born in Edinburgh, the fourth son of the late James Maitland Balfour, of Whittingehame. He studied at Eton and received the degree of M.A. from Trinity College, Cambridge. In 1885-86 he served as member of the Commission on Labor, and was private secretary to his brother, the Rt. Hon. A. J. Balfour, then president of the Local Government Board. He became a member of Parliament in 1885; from 1895 to 1900 was Chief Secretary for Ireland and introduced the Local Government Bill, and in 1900 was appointed president of the Board of Trade.

BALFOUR, Isaac Bayley (1853—). A Scottish botanist, born in Edinburgh. He graduated at the University of Edinburgh, studied at Strassburg and Würzburg, and from 1879 to 1884 was professor of botany in the University of Glasgow. In 1884-88 he was professor of botany at Oxford, and in the latter year accepted a similar chair at the University of Edinburgh. He is also King's botanist in Scotland, and keeper of the Royal Botanic Garden at Edinburgh. In 1880 he explored the island of Socotra, Indian Ocean, on behalf of the British Association and of the Royal Society, Edinburgh, in Vol. XXXI. (Edinburgh, 1888) of whose *Transactions* appeared the botanical results of the journey. He became, in 1887, an editor of the *Annals of Botany*, and has also published "Botany of Rodriguez," in *Philosophical Transactions*, Vol. CLXIII. (London, 1879), and editions of several botanical works.

BALFOUR, Sir James (? -1583). A Scotch judge and politician. He was educated for the priesthood, but devoted himself to ecclesiastical law. Robertson describes him as 'the most corrupt man of his age,' and John Knox called him 'Blasphemous Balfour.' He was implicated in the plot for the assassination of Cardinal Beaton, and after the surrender of the Castle of Saint Andrews (June, 1547) was imprisoned in the French galleys. He regained his freedom by changing his creed, and returned to Scotland. He conspired with Bothwell for the murder of Darnley, and received the governorship of Edinburgh Castle, which he later surrendered to Murray, in return for a pardon of his share in Darnley's death. He was lord president of the Court of Session during Murray's regency, but, suspected of intriguing with the adherents of the Queen, he was deprived of his office in 1568. After Murray's death, Balfour contrived to gain the favor of the new regent, Morton, and received a commission to make a general digest of the law. He was, however, not the sole author of *Balfour's Practicks*, the earliest text-book on Scottish law, for, feeling unsafe in Scotland, he absented himself in France during seven years, until the young King ascended the throne.

BALFOUR, John. One of the Covenanters who resisted the King's troops under Claverhouse (see Graham, John), at Drumclog and Bothwell Bridge, and who previously had taken part in the murder of Archbishop Sharpe, in 1679. A picturesque, and, in the main, accurate account of Balfour is given by Scott, in *Old Mortality*, where he is called 'Balfour of Burley,' though he really was Balfour of Kinloch.

BALFRUSH, bȧl-frōōsh′, or **BARFRUSH** (Pers., landing-place, market). An important commercial town in the Persian Province of Mazanderan, situated on the river Babhul, about 12 miles from its mouth in the Caspian Sea (Map: Persia, E 3). It is a clean and well-built town with a fine bazaar and the ruins of an old pleasure palace of Shah Abbas. It is connected by a well-shaded road with Meshed-i-Ser, its port, through which it carries on a considerable trade in cotton, dried fruit, and metals, chiefly with Russia. The town is also connected by a road with Teheran. The population was once estimated at 200,000, but it has since been greatly reduced by epidemics, so that at present it is less than 50,000.

BALG, bȧlG, Gerhard Hubert (1852—). An American philologist, born at Efferen, near Cologne, Germany, and educated partly in that country and partly at the University of Wisconsin, where he graduated in 1881. He received the degree of Ph.D. at Heidelberg, in 1883, and has taught at the University of Wisconsin and at private and public schools in the United States. He is the author of several valuable philological works, notably *A Comparative Glossary of the Gothic Language, with Especial Reference to English and German* (1887-89); *The First Germanic Bible, and the Other Remains of the Gothic Language* (1891), and an English edition of William Braune's *Gothic Grammar* (1883-95). He also supplied Germanic etymologies for the *Standard Dictionary*.

BALGOWNIE, bȧl-gou′nē, **BRIG OF.** A bridge of a single arch, over the Don at Aberdeen, Scotland, built in 1320.

BALI, bä′lē. One of the Dutch East India islands, situated east of Java, from which it is separated by the narrow Bali Strait (Map: East Indies, E 6). The island covers an area of over 2060 square miles. Its surface in general closely resembles that of Java. It is mountainous and volcanic, and reaches in its highest summit (the volcano Gunong-Agung), an altitude of 10,400 feet. In the lower portions of the island the common products of the East Indies, such as rice, cotton, sugar, coffee, tobacco, and indigo, are raised in large quantities. Politically the island is divided into seven semi-independent States, and a small portion annexed to the Dutch residency of Banjuwangis, on Java, and directly administered by a Dutch assistant resident. The capital is Buleleng. The population of Bali is estimated at 500,000.

The natives, anthropologically, are one of the most interesting peoples of Malaysia. Physically and linguistically they are close to the Malayan or proto-Malayan Javanese, and share the capacities of these for culture. In metal-work and sculpture they are markedly successful. The Balinese and the natives of the adjacent island of Lombok, alone in Malaysia, retain as their religion Brahmanism in a form older than that now found in Hindustan, and other traces of Hindu influence also occur. The participation of the women in trade and industry indicates a power to resist the doctrines of Islam. Of more recent literature since Laut's *Het eiland Bali en de Balienzen* (Amsterdam, 1848) may be mentioned van Vlijmen's *Bali* (Amsterdam, 1875). See Indonesians; Malays.

BALIKESRI, bä′lē-kĕs′rē, or **BALIKISRI.** A town of Asiatic Turkey, in the vilayet of Brusa, about 75 miles southwest of the city of Brusa (Map: Turkey in Asia, B 3). It contains a number of mosques and is the seat of an annual fair, visited by over 30,000 people. Its population is over 12,000, about one-fourth Christian.

BALINAG, bä′lē-näg′. A town of Luzon, Philippines, in the Province of Bulacan (Map: Luzon, E 7). It is 13 miles north of Bulacan. Population, in 1898, 14,122.

BALINESE, bä′lē-nēz′. See Bali.

BALINGHEM, bȧ′läɴ′gäɴ′. The historic site of the "Field of the Cloth of Gold," a small town near Calais, in the Department of Pas-de-Calais, France. See Field of the Cloth of Gold.

BALIOL, bā′lĭ-ol *or* băl′yol, Edward de (?-1367). The son of John Baliol. He was received as the vassal King of Scotland at the English Court, and made himself conspicuous, in 1332, by his daring and successful invasion of Scotland, then under the regency of Randolph, Earl of Moray. Accompanied by some English noblemen, bent on recovering their forfeited estates in Scotland, he landed with a few hundred followers at Kinghorn, in Fifeshire; defeated the Earl of Fife; pushed boldly into the country and, on Dupplin Moor, in Perthshire, routed with immense slaughter an army more numerous than his own. On September 24, he was crowned King of Scotland at Scone. He acknowledged English suzerainty, and promised to give up Berwick. He had enjoyed the kingly dignity for about three months, when he was surprised in his camp at Annan by a party of Scottish nobles, and nearly lost his life as well as the crown. After the capture of Berwick, in 1333, he regained the throne. He was used as a tool by Edward III. until 1356, when he surrendered to the latter the whole kingdom of Scotland. He died at Doncaster in 1367, and with him ended the house of Baliol. Consult Longman, *History of the Life and Times of Edward III.* (London, 1869).

BALIOL, John de (1249-1315). Lord of Galloway, and King of Scotland from 1292 to 1296. On the death of Princess Margaret, in 1290, he became a competitor for the crown of Scotland. As the grandson of the eldest daughter of David, Earl of Huntington, brother of William the Lion, and grandson of David I., his claim was pronounced superior to that of his principal competitor, Robert Bruce, Lord of Annandale, son of a second daughter. The arbiter on the occasion was Edward I., of England, who found this a fit opportunity for asserting his claim as Lord-paramount of Scotland. This claim was acknowledged by the Scottish Estates in submitting the contest to his decision; and, consistently with this submission, Baliol, before and after receiving the crown (November 30, 1292), swore fealty to Edward as his feudal superior. He was soon made to feel that his sovereignty was merely nominal, and the indignities which he experienced roused him to an assertion of his rights as king. With the advice of his nobles, he concluded an alliance in 1295, with France, then at war with England—an act of revolt followed by speedy chastisement. Edward invaded Scotland with a large force; defeated the Scottish troops; took Baliol prisoner, and compelled him formally to surrender his crown, July 10, 1296. Baliol was held as a prisoner for three years, enjoying, however, a limited freedom, and something of royal state. At the end of that time he was permitted to retire to his patrimonial estates in France, where he died in 1315. The estimate by his subjects of this prince was significantly indicated by the surname of 'Toom Tabard,' or Empty Jacket.

BALIOL, Mrs. Martha Bethune. The imaginary narrator of some of Scott's *Chronicles of the Canongate.*

BALIOL COLLEGE. See Balliol College.

BALISARDA, bä′lê-sär′dȧ. A magic and all-penetrating sword, mentioned in Ariosto's *Orlando Furioso.* It was made by a witch, Falerina, to kill Orlando. Orlando surprised her in the act of looking at herself in the polished blade and took it. It was afterwards stolen by Brunello, and finally came into the possession of Rogero.

BALISAUR, băl′ĭ-sä′o͞or. An East Indian badger. See Badger.

BAL′ISTRA′RIA (Low Lat. *balistra,* Lat. *ballista,* crossbow). One of the names given to those narrow apertures so often seen in the walls of old castles, through which the crossbowmen discharged their bolts. Their lower terminations are generally circular, but sometimes in the form of a shovel. They do not seem to have come into use till the Thirteenth Century. See Artillery; Loopholes.

BALIZE, bȧ-lēz′. See British Honduras; Belize.

BALKAN (bȧl-kän′ *or* bạl′k*a*n) **MOUN′TAINS** (Turk., high ridge; the ancient Hæmus). A mountain range in Southeastern Europe, in the Balkan Peninsula, forming a continuation of the Carpathian system. As such they may be considered to begin at the western extremity of the Transylvanian Alps, at the gorge known as the Iron Gates of the Danube, where the boundaries of Hungary, Rumania, and Servia meet. Thence they extend due south through Servia and along the borders of Servia and Bulgaria, then bend abruptly to the east, and continue in that direction as far as Cape Emineh, on the Black Sea (Map: Balkan Peninsula, E 3). The first section of the Balkans—that extending north and south—is formed by rounded hills and ridges, which attain an extreme elevation of about 7000 feet. The main range consists of several sections, including the Etropol, Kodja, and Shipka Balkans, which are arranged successively along an east and west axis, constituting the watershed between the Danube and the Maritza rivers and the boundary between Bulgaria and Eastern Rumelia. In this main division, comprising the Central Balkans, are the highest summits of the range, several of which exceed 7000 feet (Yümrücktchal, 7789; Kadimlia, 7410; Ambarica, 7052). The Eastern Balkans, from the vicinity of Sliven to the Black Sea, consist of numerous ridges, usually less than 3000 feet high, and of more broken character than the mountains in the western and central sections. From the Balkans various ranges extend southward toward the Ægean, the principal being the Rhodope (Despoto-Dagh), whose summits overtop those of the Balkans. Among the passes of the Balkans may be mentioned the Troyan, Rosalita, and Shipka passes, which are at elevations of 4000 to 5000 feet. The Balkan Range is composed largely of folded sedimentary strata; but in the west, crystalline schists containing deposits of copper, lead, and iron ore, are prominent.

BALKAN PENIN′SULA. A name commonly applied to the easternmost of the three great southern peninsulas of Europe, bounded by the Adriatic Sea on the west and the Black and Ægean seas on the east. Its northern boundary is generally considered to be the Danube, with its tributary, the Save. Thus defined, the peninsula comprises, within an area of about 175,000 square miles, the following countries: European Turkey, Bulgaria (including Eastern Rumelia), Servia, Montenegro, Bosnia, and Herzegovina, and the Turkish district of Novibazar (occupied by Austria-Hungary), and Greece. More accurately speaking, however, the northern boundary of the Balkan Peninsula is the parallel of 45° N. In this broader designation, the peninsula embraces, in addition, the southern half of Rumania, Dalmatia, and part of Croatia.

The eastern coast of the peninsula, overlooking the Black Sea, is generally low and marshy, and almost unbroken, except for the Gulf of Burgas. Through the Bosporus, a narrow channel about 20 miles long, the Black Sea communicates with the Sea of Marmora, which adjoins the peninsula on the southeast. The shores of the latter sea differ but little from those of the Black Sea in their general appearance. The Sea of Marmora communicates with the Ægean Sea through the Dardanelles channel. The coasts of the Ægean Sea form numerous gulfs and safe harbors of great commercial importance. The coasts of the Greek Peninsula are greatly indented, and surrounded by numerous islands. The western coast of the Balkan Peninsula, above the Gulf of Arta, which separates Greece from Albania, is generally mountainous. The greater part of the peninsula is covered with numerous mountain-chains, the chief of which is the Balkan (q.v.), to which the peninsula owes its name.

Owing to the mountainous character of the country, the rivers which traverse the peninsula are mostly short, and very few of them navigable. The most important of them are the Maritza, Vardar, and Drina. There are also several lakes, the most important of which is that of Scutari. The climate is colder than in the other Mediterranean regions in the same latitude, and the snowfall during the winter is considerable.

The leading inhabitants of the peninsula (in the narrower sense) are the Bulgarians, Serbs, Bosniaks, and Montenegrins, all of whom belong to the Slavic stock, the Turks, Greeks, and the Albanians, who are considered to be the descendants of the Illyrians, and are mostly found in Turkey and Greece. Turkey exercises suzerainty over Bulgaria and Eastern Rumelia, and nominally retains possession of Bosnia and Herzegovina, which have virtually become part of the Austro-Hungarian monarchy. The States which are absolutely independent, in addition to Turkey, are Servia, Greece, and Montenegro. The Turks first obtained a foothold in the Balkan Peninsula in the middle of the Fourteenth Century, conquered Constantinople in 1453, putting an end to the Byzantine or Greek Empire, and soon after were masters of the whole peninsula. The Turkish Empire in Europe fell to pieces in the course of the Nineteenth Century, and at the present time Turkish rule extends over only about one-third of the region. The strife of nationalities is intense in the Balkan Peninsula, and threatens at any moment to disturb the existing order. Consult: Miller, *Travels and Politics in the Near East* (London, 1898); D. G. Hogarth, *The Nearer East* (New York, 1902); and Tuma, *Die östliche Balkan-Halbinsel* (Vienna, 1886).

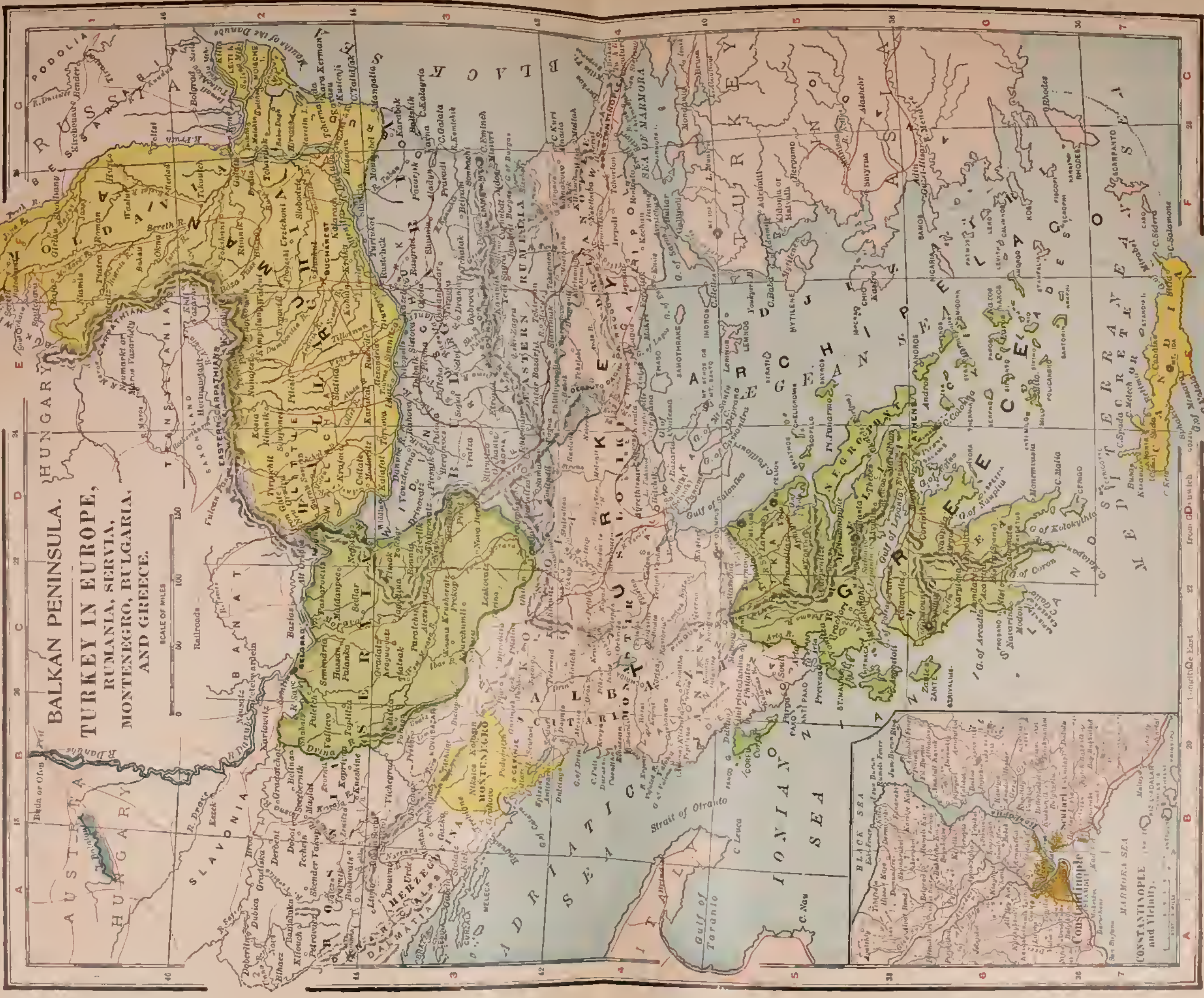
BALKES, bäl′kēs. The name which Arabian legend gives to the Queen of Sheba, who visited Solomon, married him, and bore him a son. She is mentioned in the 26th surah of the Koran, and also in Beckford's *Vathek* (q.v.).

BALKH, bälk. A district of Afghan Turkestan, corresponding to ancient Bactria. It is bounded on the north by the River Amu, on the east by Badakhshan, and on the west by the desert. Offsets of the Hindu-Kush traverse it in a northwestern direction, and slope down to the low steppes of Bokhara. The soil has the general characteristics of a desert land; only a few parts are made fertile by artificial irrigation. The climate shows great variation. The commercial importance of the district has greatly diminished with the discovery of the sea route around the Cape of Good Hope. The inhabitants, whose number cannot be ascertained, are Usbeg Tartars, and range in character and occupation from plunderers of caravans to tillers of the soil and artisans.

BALKH, bälk (Turk., high town; anciently, *Bactra*). The capital of a district of the same name, in Afghan Turkestan, situated where the Balkh River separates in numerous canals, about 23 miles south of the Amu-Darya, or Oxus River (Map: Asia, Central, K 3). It is surrounded by a mud wall; but though bearing the imposing title of Amul-Balad ('mother of cities'), it has little of the grandeur of ancient Bactra, on the site of which it is built. It contains a mosque, a citadel, and several half-ruined schools. It was twice destroyed by Genghis Khan and Timur, and in 1825 it was plundered by the powerful ruler of Kunduz, Mir-Murad-Bei. There is a new town of the same name a short distance to the north of Balkh. The population is estimated at from 6000 to 15,000.

BALKHASH, bȧl-käsh′ (probably the *Vouru-Kasha* of the Avesta; *vouru*, great + *kasha*, lake). The fourth lake in size on the Eurasiatic Continent, near the eastern borders of Russian Central Asia, in latitude 45° and 48° N., and longitude 75° and 79° E. (Map: Asia, G 4). It has an area of 8600 square miles, and stretches from southwest to northeast over a distance of 330 miles; its breadth varies from 6 miles in the eastern part to 54 miles in the western. The northeastern shores of Balkhash are so low that it is often difficult to locate their outline. The lake is shallow, navigation irregular, and the fisheries unimportant. It is frozen from November to April. It has several feeders from the southeast, the principal of which is the navigable river Ili. The largest of several islands is Utch-Aral, near its western shore.

BALL (OHG. *balla*, Ger. *Ball*, Fr. *balle;* cf. Eng. *bale*, a round pack). The ball was to the primitive man not an implement of sport, but an absolute necessity of existence. The first were stones rounded by the action of tide or current, and man used them with a sling to crush in the forehead of the beasts upon whom he fed. Specimens of the *Bos primigenius* so slain have been exhumed from ancient bogs. The slaying of Goliath by David will immediately come to mind as an instance in which the stone ball from the brook was used as a weapon of offense. Hannibal's Balearic slingers, in the second Punic War, demoralized the Roman infantry by the terrible execution they did while yet at a distance and out of sight. The sling remained a part of the equipment of the English Army until the Fifteenth Century. The South Americans had a modification of the sling in their *bolo*. They attached a ball to each end of a thong,



BALKAN PENINSULA.

TURKEY IN EUROPE, RUMANIA, SERVIA, MONTENEGRO, BULGARIA, AND GREECE.

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with another in the centre to hold by and get the necessary impetus. These were thrown and twirled round the legs of a distant and fleeing animal, bringing it to earth.

As an aid to outdoor activities and sports the ball claims a venerable antiquity. Thus, one of the most beautiful episodes in the *Odyssey* is the description of Nausicaa and her maidens, in which, as rendered by Pope,—

> "O'er the green mead the sportive virgins play,
> Their shining veils unbound—along the skies,
> Tos't and retos't the ball alternate flies."

The ball games of the Greeks came to be much valued as a means of giving grace and elasticity to the figure, and in the special rooms provided for them in the gymnasiums they were played almost daily by persons of all ages and ranks. A teacher (*pilicrepus*) was in attendance, and certain rules and gradations of the exercise were observed, according to the physical condition of the player. The Romans also practiced ball-playing in connection with their baths, but it never assumed the importance attached to it by the Greeks. Of the various kinds of balls used by them, the commonest were the *pila*, a handball stuffed with hair, and the *follis*, a large, inflated skin like a football. There were several recognized games, vaguely resembling handball and football; and in the Byzantine period a game distinctly similar to the modern polo was played on horseback by the nobles.

Ball-playing seems to have been of great antiquity in the west of Europe also. In the Sixteenth Century it was in great favor in the courts of princes, especially in Italy and France. Houses were built for playing in all weathers, and in gardens long alleys were laid out for the purpose, the names of which still adhere to many localities. Thus, one of the most famous streets in London takes its name from the Italian *palla*, a ball, and *maglia*, a mallet—the game thus denoted being described in Blount's *Glossographia* (1656):

"Pale-maille: a game wherein a round bowl is with a mallet struck through a high arch of iron (standing at either end of an alley), which he that can do at the fewest blows, or at the number agreed on, wins. This game was heretofore used in the long alley, near Saint James's, and vulgarly called pell-mell."

From the *jeu-de-paume* of the Middle Ages came the modern tennis, racquets, and lawn tennis. The origin of football is equally remote. It has been discovered in regions as far apart as the Faroe Islands in the north, New Zealand in the south, and the Philippines in the tropics. A peculiar kind of game with an inflated ball was played by the Indians of the Amazon; they threw it in the air, and shot at it from opposite directions with blunt arrows. The game of lacrosse originated with the North American Indians, and evidently could have had no connection with the Oriental games, though it is not unlike them in several respects. But in all these questions of origins, the historical data are so meagre and the modifying influences of various games upon one another have been so general, that the true history of few games can be completely told. Besides the many famous games of universal acceptance in which the ball is the prime factor, there are many less known sports, popular in certain localities, which are in the same way dependent upon it. The Frenchmen play the game of the hammer, hitting a ball along the highways; the Italians play *pallone*, by striking the ball with a rubber casing worn over the hand. The Spaniards are devoted to their *fronton*, which is akin to handball. Even the Eskimos have their ball-game to while away the tedium of the long winter; and marbles are too universal to be restricted to any locality or period. See BASEBALL; FOOTBALL; TENNIS; BASKET BALL.

BALL. Ammunition for fire-arms or ordnance. Before the era of hollow or elongated shells and bullets, all projectiles were solid and spherical. The term ball ammunition or ball-cartridge, however, is still used as a distinction from blank ammunition. In military pyrotechny, 'balls' in many varieties are used, either to give light, produce dense smoke, or diffuse suffocating odors. In these latter respects, however, they are, under modern conditions, rarely if ever used. See AMMUNITION; ORDNANCE; and PROJECTILES.

BALL, JOHN (?-1381). An English preacher, well known for his connection with the Wat Tyler Insurrection in 1381. It was Ball who preached from the famous text:

> "When Adam dalf, and Eve span,
> Who was thanne a gentilman?"

He was executed at Saint Albans on July 15, 1381. See TYLER'S REBELLION.

BALL, Sir ROBERT STAWELL (1840—). An English astronomer. He was educated at Trinity College, Dublin, and after holding successively many important official and university positions, became professor of geometry and astronomy at the University of Cambridge. He has written *Elements of Astronomy* (1880); *The Story of the Heavens* (1885); *The Story of the Sun* (1894); and *Great Astronomers* (1895), besides many magazine articles, essays, lectures, and reviews. He was knighted in 1886. In 1902 he visited the United States, and addressed several public or semi-public meetings.

BALL, THOMAS (1819—). An American sculptor, born in Charlestown, Mass. In early life he was a singer, and distinguished himself as a basso in *Elijah*, but soon began painting miniatures and portraits. In 1852 he made busts of Jenny Lind and Daniel Webster, and a life-sized statue of the latter, and then spent many years in Florence, Italy. He made the bronze equestrian statue of Washington in the Boston Public Garden, the bronze of Webster in Central Park, New York, and the group "Emancipation," in Washington, D. C. He published *My Threescore Years and Ten* (Boston, 1891).

BAL'LAD (OE. and OF. *balade*, Fr. *ballade*, dancing song, from Late Lat. and It. *ballare*, to dance, from Gk. *βαλλίζειν*, *ballizein*, to dance; cf. *ball*, *ballet*). A versified narrative, in a simple, popular, and often rude style, of some valorous exploit, or some tragic or touching incident. Indeed, as far as subject is concerned, the ballad is a species of minor epic. It is comparatively short, the story being circumscribed, and not embracing a combination of events, as the plan of the grand epic does. There can be little doubt that the ballad has been the earliest form of poetry among all nations, and that the earlier epics or heroic poems of the higher kind, such as the *Cid* or the *Nibelungenlied*, grew out of such simple beginnings. The old ballads were handed down orally, and thus underwent constant changes. Accordingly, unlike modern poems, the popular ballad has no individual author, and the treatment of the theme, whether war, crime, love, or enchantment, was thus always objective, there being no poet to thrust forward his own emotions. These ballads make their appeal directly to the common feelings of love, hate, fear, shame, and grief, by means of a great variety of incident. Some of them are humorous, being merely *fabliaux* in ballad-measure; some are versions of current romances, but the best of them spring from native tradition. It was long ago observed that the ballads of various nations are frequently based upon the same or similar incidents; and the tracing of the development of these primitive *Märchen*, whether they were carried from people to people by wandering minstrels or are the common inheritance of the Indo-European races, is of more interest and value to the student of folk-lore than is the study of their form to the historian of poetry.

All the British ballads, in their present form, are of comparatively recent date; the oldest manuscript now existing is assigned to the first quarter of the Fifteenth Century. But there are allusions to Robin Hood, by Langland, fifty or more years earlier; and, according to Child, this story undoubtedly began to assume a ballad form as early as the Thirteenth Century. There is no reason, in any case, to doubt that the Anglo-Saxons had their narrative songs; indeed, Tacitus speaks of certain *carmina* among the Germanic peoples, though none of these have survived independently, being fused in such connected works as *Beowulf* and the *Nibelungenlied*. Of British ballads, those in the Scotch dialect are the best, being much more spirited than those composed in England. This may be accounted for partly by the fact that in the North their traditional form was long preserved, while in the South they got into print early, and were thus subjected to a kind of revision which amounted to mutilation. It is difficult to make a selection, owing to the abundance of material, but among the best known are the "Gest of Robin Hood," a series of ballads forming a miniature epic: "The Hunting of the Cheviot;" "Sir Patrick Spens;" "Mary Hamilton;" "The Wife of Usher's Well;" "The Twa Corbies;" "Clerk Saunders," and "Fair Helen of Kirkconnel Lea." All these old ballads were intended for a musical setting. If short, they were sung; if of considerable length, they were chanted, often by professional minstrels, to the accompaniment of some instrument, as the harp or fiddle. The typical stanza (though subject to variations) consists of two rhyming verses, each having seven accents, divided into lines of four and three accents. Ballads were always popular in England, although after the invention of printing they were not so commonly sung. In the Eighteenth Century, a great revival of interest in the older ballad literature took place, stimulated largely by the publication, in 1765, of Percy's *Reliques of Ancient English Poetry*, derived mainly from a Seventeenth Century manuscript. Other famous collections followed: Scott's *Border Minstrelsy* (1802-03) and Motherwell's *Minstrelsy, Ancient and Modern* (1827). The influence of Percy's book was very great, in both England and Germany. It led to a whole class of imitative ballad literature, of which may be mentioned Bürger's "Lenore," Coleridge's "Ancient Mariner," Tennyson's "Revenge," and Rossetti's "King's Tragedy." Such imitators, however, have rather taken suggestions from than held close to the older ballad form, and have especially departed from their models in the intrusion of the subjective note characteristic of modern poetry. In fact, the paramount interest of the revival of balladry lies in the fact that it broke up the exclusive domination of the heroic couplet, and led to freer versification.

The oldest extant German ballad of the kind described under this title is the famous *Hildebrandslied*, which can be traced to the Eighth Century, and is the only survivor of its period and class. By the middle of the Twelfth Century, the development of German poetry, despite all Romance influences, had definitely won its greatest triumphs in the field of native ballad literature. By 1300, the courtly minnesinger had begun to give place to the *bourgeois* meistersinger; and the latter, for two centuries, summed up the poetical life of the nation in their ballads. The Sixteenth Century was a period of rapid decline, as in England; and it was not, as already indicated, until Percy's influence on Herder and Bürger had caused a revival of interest that the ballad again came to the front, and was during the Nineteenth Century a subject of wide literary interest.

Among the Latin nations the Spaniards possess the richest ballad literature. Here the fact that the ballad preceded the romance is easy of demonstration. The simple emotions of the people are vividly depicted in the *coplas*, *seguidillas*, and *muñeiras* which sprang up in great numbers. The octosyllabic line was the commonest metre, and assonance was used instead of rhyme.

The ballads (*pjesme*) of Servia, while comparatively little known, deserve an important place in any general treatment of the subject. Their history is at least as long as that of the Western ballads; and the researches of recent scholars, especially Vuk Stephanovich (1787-1864), have succeeded in accumulating in permanent form a vast mass of them which possess the same general characteristics in subject as the other ballads, while as to form the older ones are generally composed in fifteen and sixteen syllable lines, the modern in decasyllabic metre. As a nation comparatively untouched by modern unifying civilization, the Servians are still producing, or maintaining in popular use, ballads which look upon life from the simple primitive point of view, which has long been lost in the West.

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BALLADE, bȧ′läd′ (Fr., see Ballad). A poem which consists of 3 stanzas of 8 lines, followed by one of 4 lines (known as the 'envoy'), or 3 of 10 lines with envoy of 5, each of the stanzas and the envoy closing with the same refrain. In the ballade of 8 lines there are but 3 rhymes, in this order: *A*, *B*, *A*. *B*, *B*, *C*, *B*, *C*; the envoy repeats the last 4. The envoy is a special feature of the ballade and chant-royal; it was usually a form of dedication to a noble patron, so that even in modern ballades it generally begins wth a vocative, as 'Prince!' 'Princess!' or the like. The chant-royal is merely an enlarged ballade, with 5 stanzas of 11 lines and envoy of 5. While poems of undecided structure, called rondeaux, and ballades, began to make their appearance at the end of the Twelfth Century, yet the ballade, as a strict metrical form, is really due to Villon and Charles of Orleans. Théodore de Banville revived this and other early French forms about 1860, and they have since been successfully imitated in English by Swinburne, Andrew Lang, Austin Dobson, Edmund Gosse, W. E. Henley, and others.

BALLADINO, bäl′lȧ-dē′nō, Antonio. .A versifier in Ben Jonson's *The Case is Altered*, whose motto is: "Tut, give me the penny; I care not for the gentlemen, I." Munday, a contemporary dramatist, is satirized.

BALLAGI, bŏl′lŏ-gē, Mór (Moritz), originally **BLOCH**, blōk (1815-91). A Hungarian philologist and theological author, born at Inócz, of Jewish parentage. After completing his studies at Budapest and Paris, he undertook a translation of the Bible into Hungarian, for the purpose of Magyarizing the Jews. Of this work, only the Pentateuch and the Book of Joshua were published (Budapest, 1840-43). He became a Protestant in 1843, and thereafter studied theology at Tübingen. From 1855 to 1878 he was professor of theology at Budapest. His philological works include: *Ausführliche theoretisch-praktische Grammatik der ungarischen Sprache* (1843; 8th ed., 1881); *Vollständiges Wörterbuch der ungarischen und deutschen Sprache* (2 vols., 1854-57; 6th ed., 1890); *Sammlung der magyarischen Sprichwörter* (2 vols., 1850; 2d ed., 1855).

BALLANCHE, bȧ′länsh′, Pierre Simon (1776-1847). A French writer on social theories. Among his works may be mentioned: *Antigone* (1815); *Essai sur les institutions sociales dans leurs rapports avec les idées nouvelles* (1818); *Le vieillard et le jeune homme* (1819); *L'homme sans nom*—a novel (1820); *Palingénésie sociale* (never completed), and *La vision d'Hébal* (1832). The *Palingénésie*, which he did not finish, was to be an exposition of the workings of God in history, and is considered his greatest work. His system, termed 'Ballanchism,' attracted much attention. Ballanche was a member of the circle gathered around Châteaubriand and Madame Récamier, his platonic affection for the latter forming part of the literary history of his period.

BAL′LANTINE, James (1808-77). A Scottish artist and poet. He was born in Edinburgh; received instruction in drawing from Sir William Allen, and was one of the first to revive the art of glass-painting. He made the stained-glass windows for the House of Lords, and in 1845 published *A Treatise on Stained Glass*, which was translated into German. Two volumes, *The Gaberlunzie's Wallet* (1843) and *Miller of Deanhaugh* (1845), contain some of his best-known songs and ballads.

BAL′LANTYNE, James (1772-1833). A Scotch printer, born at Kelso. He studied at Edinburgh University, and in 1796 became proprietor and editor of the *Kelso Mail*. He published Sir Walter Scott's *Minstrelsy of the Scottish Border*, and in 1802, at Scott's advice, set up a printing establishment at Edinburgh. In 1808, he also became a member of the firm of John Ballantyne & Co., booksellers, and from 1817 he edited the *Weekly Journal*. Not only did he read the proofs of Scott's works for technical details, but oftentimes he proffered criticisms which, as Lockhart testifies, led Sir Walter to introduce important changes into the treatment of a subject. Although not himself responsible for the financial difficulties of Scott, he was involved in the failure of Constable & Co., and subsequently was retained by the trustees of the creditors to conduct the literary affairs of the printing establishment and to edit the *Weekly Journal*.

BALLANTYNE, James Robert (1813-64). A British Orientalist, born at Kelso, Scotland, and educated at the College of Haileybury, England. He was at first instructor at the Scottish Naval and Military Academy, but afterwards was sent to India to take charge of the Government Sanskrit College at Benares, with which institution, after 1856, he was also connected as professor of moral philosophy. Upon his return to Europe, he was appointed librarian of the East India Office. His primary aim, as embodied in his works, was the elucidation of Oriental ideas in such a way as to show their relation to European science. His works include: *The Practical Oriental Interpreter; or, Hints on the Art of Translating readily from English into Hindustani and Persian* (1843); *Catechism of Sanskrit Grammar* (2d ed. 1845); *A Synopsis of Science in Sanskrit and English reconciled with the Truths to be Found in the Nyaya Philosophy* (1856)—a work of genuine scientific merit; *Christianity Contrasted with Hindu Philosophy* (1859).

BALLANTYNE, Robert Michæl (1825-94). A Scottish author, born at Edinburgh, a nephew of James Ballantyne (q.v.). In 1841-47 he was in the service of the Hudson's Bay Fur Company in Rupert Land, and in 1848 published an account of his experiences as, *Hudson's Bay; or, Life in the Wilds of North America*. From 1856, in his own words, he "lived by making storybooks for young folks." Of these he wrote more than eighty, with much success.

BAL′LARAT′. The most important commercial centre, next to Melbourne, in the State of Victoria, Australia (Map: Victoria, C 4). It consists of the two municipalities of Ballarat West and Ballarat East, situated in one of the richest of Australian gold-fields, on the west and east banks of the Yarrowee Creek. It is 74 miles northwest of Melbourne, by rail. Its chief industries are those of the gold-mines, iron-foundries, woolen and flour mills, breweries, and distilleries. It is the see of Anglican and Catholic bishops. has many handsome buildings, churches, city hall, two town halls, hospitals, two college free libraries, several schools, and municipal gas and water-works. Its establishment and rise date from the discovery of gold in 1851. The largest gold nuggets ever unearthed were discovered here. Ballarat West was made a municipality in 1855, and in 1870 was incorporated as a city. Population, in 1891, Ballarat West, 24,257; Ballarat East, 16,592—total, 40,849; in 1901, Ballarat West, 25,448; Ballarat East, 18,262—total, 43,710.

BAL'LAST (first part of uncertain origin; perhaps Eng. *bare*, mere + *last*, burden, weight). Weight carried by a ship or boat to secure proper stability, both to avoid risk of capsizing and to secure the greatest effectiveness of the propelling power. Modern steamers have tanks fitted for water ballast, and rarely carry any other kind. The tanks are located forward, aft, and amidships, in order that the vessel may not only be immersed to a safe extent, to avoid danger of capsizing, but also so that the trim, or inclination of the keel to the surface of the water, may be adjusted. When light (i.e. with little or no cargo), steamers require *trimming* by the stern (i.e. to have the stern more deeply immersed than usual), in order to submerge the screw or screws. Sailing vessels require greater stiffness (i.e. power to resist capsizing) than steamers, in order to stand up under the force of wind against their sails, as well as to resist the motion imparted by the waves. They usually carry a certain amount of permanent ballast in the form of pig iron. If additional ballast is necessary, any convenient heavy material, such as gravel, stones, etc., is used. The amount of ballast needed depends not only upon the depth of immersion, but upon the shape of the hull, some forms of which require more ballast than others. Under average circumstances, a ship is said to be well ballasted when the water comes up to about her extreme breadth amidships. In ballasting or stowing cargo, the ballast and cargo are considered together, the quantity and distribution of the former being dependent on the latter. The combined effect of both should not place the centre of gravity too low or too high. If too low, the ship will be unduly *stiff*, and will roll violently and jerkily, though perhaps not deeply; and she will sail sluggishly, except in a comparatively smooth sea. If the centre of gravity is too high, the vessel will be *crank*, and will be dangerous from lack of power to right herself when heeled over by the wind pressing on her sails or the action of the waves: she may roll deeply, but her rolls will be slow; crankness interferes with speed under sail, because it reduces the amount of sail which can be safely carried; furthermore, the lack of righting power, or stability, which causes crankness, prevents the vessel from responding quickly to the action of the waves. A vessel is said to be *in ballast* when she has ballast only, and no cargo, on board.

The term ballast is applied to bags of sand placed in the car of a balloon to steady it and enable the aëronaut to lighten the balloon, when necessary to effect a rise, by throwing part of the sand out. Civil engineers use the term ballast to signify the sand or gravelly material which is laid as a foundation for roads, concrete floors, etc., or as packing between railway sleepers, in order to give them solidity. No modern railway is considered to be complete or safe for transit until it is dressed and finished by ballasting. The possibility of procuring ballast at a cheap rate considerably affects the course of railway undertakings.

BALLAST PLANTS. Plants growing on or distributed from the ballast of ships, from seeds which were contained in the ballast when loaded on the vessel, or which have fallen on it in transit. Various kinds of plants have thus been transported from one region to another. Botanists have recently made a special study of ballast plants in relation to the general subject of the transportation of plants by different agencies.

BAL'LATER (Gæl. *baile*, town + *leiter*, slope of a hill). A village and police burgh of Aberdeenshire, Scotland, on the Dee, 36 miles west-southwest of Aberdeen (Map: Scotland, E 2). It is frequented on account of the medicinal springs in the neighborhood.

BALL CLAY. See CLAY.

BALLENSTEDT, bäl'len-stĕt. A town in the German Duchy of Anhalt, situated in the Harz Mountains, about 7 miles by rail from Quedlinburg. It is celebrated chiefly for its castle, now the residence of the dukes of Anhalt-Bernburg. From the Tenth to the Sixteenth Century the castle was a Benedictine monastery. It has a fine park, an extensive library, and a number of valuable collections. Population, in 1900, 5423.

BALLENY (băl-lā'nê) **IS'LANDS.** A group of islands in the Antarctic Ocean, situated in about latitude 66° S., and about longitude 163° E. (Map: Antarctic Region, D 10). It consists of five islands, of volcanic origin, and covered with glaciers. One of the group, Young Island, possesses a mountain about 12,000 feet high. The group was discovered by Balleny, in 1839.

BALLESTEROS, bä'lyå-stā'rōs, DON FRANCISCO (1770-1832). A Spanish general and statesman, born at Saragossa. He entered the army and served with distinction against the French. When the Duke of Wellington was appointed to the chief command of the allied armies, Ballesteros resigned, refusing to serve under a foreigner, in consequence of which he was banished to Ceuta. Upon his return he received the command of an army corps, and became Minister of War, in 1815. Appointed Vice-President of the Provisional Government by Ferdinand VII., he opened the prisons of the Inquisition, returned to the municipality of Madrid the rights granted by the Cortes in 1812, and, at the head of the national militia, dispersed the enemies of the Constitution. In the war against France (1823), he was compelled to retreat and to agree to terms of peace. Excluded from the general amnesty, he was forced, upon the downfall of the Constitutional Government, to flee to Paris (1824), where he lived in retirement until his death.

BALLESTREM, bäl'les-strâm, FRANZ XAVER, Count von (1834—). A German statesman. He was born on the family estate of Plawniowitz in Upper Silesia, studied at Liège, and entered the Prussian Army in his twenty-first year. He served in the campaigns of 1866 and 1870-71, and at the close of the latter retired with the rank of captain, devoting himself thenceforth to a political career. He was elected to the Reichstag in 1872, and took a prominent position in the Centre Party, being appointed a Papal chamberlain by Pius IX. for his vigorous services in the Culturkampf. He was first vice-president of the Lower House, 1890-93.

BALLET, băl'lā′ *or* băl'lĕt (Fr. dimin. of *bal*, dance, It. *ballo*, ball, dance, from Late Lat. and It. *ballare*, to dance; cognate with *ballad*). A species of dance, usually forming, on the stage of the present day, an interlude in operatic or other theatrical performances. Owing to its resemblance in this respect to the chorus of classic Greek tragedy, attempts have been made to trace its history back to the pantomimic sacrificial dances of antiquity. The modern ballet, however, is a development from the court festivities of late mediæval times. We find it existing in Italy in the beginning of the Sixteenth Century, especially at the Court of Turin, where scions of the noblest houses took part in it, in song and declamation, as well as in dance; for the ballet at first appeared in combination with other theatric arts, and completed the chaotic medley exhibited in these spectacles, which were at once mythological, allegorical, fantastic, warlike, and pastoral. From these mingled elements, the ballet, like other features of dramatic entertainments, gradually evolved as a distinct species.

Under Catharine de' Medici it was introduced into France, where most of its modern development has taken place. Baltasarini (called Beaujoyeux), Catharine's director of music, conducted in 1581 the famous *ballet comique de la reine*, and this sort of entertainment soon became such a favorite that royalty itself participated in its performance. Both Louis XIII. and Louis XIV., when young, are said to have danced in the *ballets-de-cour*, which were still at this period accompanied not only by music, but by recitation and song; the expressiveness of dancing and pantomime had not yet reached its distinct development. One of the most famous of the court ballets was the *Triomphe d'Amour*, produced by Quinault, Benserade, and Lulli in 1681. It was Lulli who is said to have first had women participate in a ballet, even female parts having up to his time been taken by young men. The idea of the ballet in pantomime without words, as we have it, was suggested early in the Eighteenth Century by the Duchess of Maine. The celebrated Noverre put her idea into practice, and developed the so-called *ballet d'action*, in which the expressive power of dance and gesture attained by themselves a high degree of dramatic art. During the Eighteenth Century also the famous Vestris family of dancers came to celebrity. Gaëtan Vestris, the first of them, thought so highly of himself as an artist that he was wont to say that there were but three great men in the world—himself, Voltaire, and the King of Prussia. His son, Auguste, was no less distinguished. With the Revolution, the ballet figured prominently in many of the national fêtes, and somewhat changed its character. The great dramatic pantomime flourished also with Galeotti in Copenhagen, and in Milan longer than the earlier traditions were maintained elsewhere. In France, during the Consulate, an element of comedy was introduced into the ballet in such works as Méhul's *Dansomanie* and the *Arlequinades*. During the Nineteenth Century the ballet came gradually to its present form. Perhaps the three most famous dancers of the century were Marie Taglioni, who appeared in the *Carnival de Venise*, in 1827, and became immensely popular; Carlotta Grisi, who was famous in *Giselle;* and Fanny Ellsler, who was especially a favorite in *La Tarantule* and *Le Diable boiteux*.

In the opera of the present day, the ballet is generally more or less integrally incorporated in the play. Thus in *Faust*, it appears as part of the entertainment with which Faust is diverted in accordance with the plans of Mephistopheles. In many instances, however, the ballet has lost its original artistic character, and the forms which it takes are in taste extremely various. Consult: Menestrier, *Des ballets anciens et modernes* (Paris, 1682); Noverre, *Lettres sur la danse et sur les ballets* (Lyons, 1760, new ed., Paris, 1807); Castil-Blaze, *La danse et les ballets* (Paris, 1832); Voss, *Der Tanz und seine Geschichte* (Berlin, 1868); A. Pougin, *Dictionnaire historique du théâtre* (Paris, 1885).

BALL′-FLOW′ER. A detail of ornament in English Gothic architecture, so named from its resemblance to a ball within a flower, usually with three, sometimes with four, petals. The ball-flower is supposed by some to be an imitation of a pomegranate; by others, of a hawk's bill.

BALLINA, bä'lē-nä′ (shortened from Gæl. *Bel-an-atha-an-feadha*, the ford south of the wood, from *bel*, estuary + *ath*, ford). A seaport town in the counties of Mayo and Sligo, Ireland, on the Moy, 7 miles south of its entrance into Killala Bay (Map: Ireland, B 2). The Moy runs through the town, is crossed by two bridges, and separates the two counties. Ballina proper is on the Mayo side, the Sligo portion being called Ardnaree. The river is navigable from the sea to a mile and a half below Ballina. Ballina has a brisk trade in agricultural produce, in salmon, and cured provisions; and coarse linens and snuff are manufactured. The United States is represented by a consular agent. The river Moy and Lough Conn are favorite angling resorts. Killala Bay was the rendezvous of the French invaders in 1798. They landed and took Ballina, but three weeks afterwards were defeated at Killala. Population, estimated, 5000.

BALLIOL (bāl'yol) **COLLEGE.** One of the largest and most important colleges in the University of Oxford. Its original foundation is attributed to Sir John de Balliol of Barnard Castle, Durham (father of the Balliol who contested the crown of Scotland with Bruce), as an act of penance for injuries done to the churches of his neighborhood. Its first scholars were in residence between 1260 and 1266, in a hired house; but while Balliol may claim, on the ground of the longest occupation of the same site and of priority in the benefaction to which it owes its inception, to be the oldest of the Oxford colleges, it was not, until twenty years later, a college in the modern sense of the word; it was originally, like the colleges of Paris at the same time, simply an association of students presided over by a principal of their own election, and did not become an endowed corporation with a permanent home until, in 1282, Devorguilla, wife of John de Balliol, completed the scheme and gave the college its first statutes. It was long comparatively unimportant. Although Wiclif became its master about 1360, it was for a while the home of the champions of the scholastic philosophy. In the Fifteenth Century it became 'the nursing-mother of the early English humanists,' such men as Humphrey, Duke of Gloucester, and John Tiptoft, Earl of Worcester, being numbered among its scholars. After this period of brilliance, Balliol was little heard of until the Nineteenth Century, when it came once more to the front. It was blessed with a succession of able masters, of whom the most famous was Benjamin Jowett; it received many notable benefactions, particularly the Snell Exhibitions, which have attracted many brilliant Scotchmen, among them Adam Smith, Sir William Hamilton, and J. G. Lockhart; and, at the same time that it set the example (with Oriel) of opening its scholarships to general competition, it established a rigid standard of ability for its members, by requiring from them an additional entrance examination and obliging them to read for honors in the schools. The college consists of a master, 12 fellows, about 50 scholars and exhibitioners, and nearly 200 other undergraduates. Its buildings date from the library, part of which is as old as 1430, to the present hall, completed in 1877. It has a long list of distinguished graduates, particularly in the Nineteenth Century. Among poets and men of letters, it can boast of Southey, Matthew Arnold, Swinburne, Clough, Andrew Lang, and Calverley, besides having associated to itself Robert Browning as an honorary fellow. To the Oxford Movement it contributed Cardinal Manning and William George Ward; and, to the English Church, two of its primates, Tait and Temple. And more than one of the intellectual and social movements specially characteristic of the end of the Nineteenth Century owe their inspiration to T. H. Green, fellow of Balliol from 1860 and afterwards professor of moral philosophy.

BALLIS'TA. See ARTILLERY.

BALLIS'TIC PEN'DULUM. See BALLISTICS.

BALLIS'TICS (*Ballista*, an engine for hurling missiles—Lat. from Gk. *βάλλειν*, *ballein*, to throw). The science which treats of the motion of heavy bodies projected into space. Its usual meaning is, however, restricted to the motion of projectiles of regular form, fired from cannon or small arms. The subject, considered as a branch of the science of gunnery, is divided into *Interior Ballistics*, which treats of the motion of the projectile inside the bore of the gun; *Exterior Ballistics*, which treats of the motion of a projectile between the muzzle of the gun and the object it strikes; and *Ballistics of Penetration*, which treats of the effects of the projectile upon the object it strikes.

INTERIOR BALLISTICS. In interior ballistics, we calculate the velocity of translation and rotation which the combustion of a given charge of powder, of known composition and quality, will impart to a given projectile, and the effect upon the gun. The following definitions will enable the non-technical reader to appreciate better some of the problems with which this science deals:

The *Specific Gravity* of powder is the weight of a given volume of powder referred to that of an equal volume of water.

Gravimetric Density is the density of the powder when the spaces between the grains are considered.

Explosion is the rapid conversion of powder into gases and solids with evolution of heat. It may be divided into three parts: *Ignition*, which is the setting on fire of a part of the grain or charge; *Inflammation*, which is the spread of the ignition from point to point of the grain or charge; and *Combustion*, which is the burning of the inflamed grain or charge from the point of ignition.

Velocity of Emission is the rate of evolution of the gas of gunpowder.

A *Progressive Powder* is one that burns slowly at first and more rapidly afterwards.

Density of Loading is the ratio of weight of the charge of powder to that weight of water, at its maximum density, which will completely fill the volume in which the charge is fired.

The *Force* of the powder is the pressure per unit of surface exerted by the gases from the unit weight of powder, the gases occupying at the temperature of explosion a volume equal to unity.

The *Passive Resistances* are those due to the forcing of the band of the projectile into the grooves of the rifling, friction, etc.

The *Ballistic Coefficient*, 'C,' for a given projectile depends upon the cross-section and weight of the projectile and the density of the air, and measures the ballistic efficiency of the projectile.

The *Factor of Effect* is the ratio of the actual work realized by the projectile at the muzzle to the entire work of the charge.

The *Energy* of the projectile means its power to do work, and is proportional to its weight and the square of its velocity.

HISTORY. It is only within the last fifty years that the complicated phenomena which take place within the bore of the gun when the charge is fired have been clearly comprehended. The celebrated Benjamin Robins (1740), elsewhere referred to in this article, made many experiments relating to interior ballistics. His deductions from his experiments, in spite of the extremely erroneous and sometimes absurd opinions on the subject that were entertained in those days, justly entitle Robins to be called the 'father of modern gunnery.' Dr. Hutton's experiments verify most of Robins's deductions, differing principally in the estimate of maximum temperature and pressure. D'Arcy (1760) made the first attempt to determine dynamically the law of pressure of gases in the bore of a musket by measuring the velocity of the projectile at different points of the bore. His method was successively to shorten the barrel, and measure, for each length, the velocity of the bullet by means of a ballistic pendulum. From these velocities he got the corresponding accelerations, and then the pressures by multiplying the accelerations by the mass. Count Rumford (1792) made the first attempt to measure directly the pressure of fired gunpowder. The account of his experiments was the most important contribution to interior ballistics which had been made up to that time. His apparatus consisted of a small wrought-iron mortar, mounted, with its axis vertical, upon a solid stone foundation, and having a projecting axial vent with no outside opening. The charge was fired by applying a red-hot ball provided with a hole, into which the projecting vent-tube was inserted, there being no gas lost through the vent by this arrangement. The muzzle was closed by a stopper, upon which rested a weight used for confining the elastic fluid resulting from the combustion of the powder. The charges were increased a grain at a time from 1 grain to 18 grains, and for each charge a weight was found by experiment just sufficient to retain the gaseous product. From the mean of all the observed pressures, Rumford found the maximum pressure—that is, the pressure when the powder entirely filled the space into which it is fired—to be 29,178 atmospheres, about four and one-half times the maximum pressure found by Noble and Abel, in an entirely similar set of experiments, nearly a century later. The result found by Noble and Abel (6554 atmospheres, or 45 tons per square inch) is accepted by all writers on interior ballistics as being very near the truth. Various other scientists did original work of more or less value to the development of interior ballistics prior to the year 1860. Consult the works of Gay-Lussac, Chevruil, Graham, Cavalli, Mayevski, Otto, Neumann, etc.

Gen. T. J. Rodman, of the United States Ordnance Department, made a series of important experiments (1857-61) relating to the pressure and muzzle velocity, due to the variation in the size of the powder grains and the densities of loading. General Rodman invented what he called the 'indenting apparatus,' which is now known and extensively used all over the world, under the name of 'Rodman's Pressure Gauge.' He was also the first person to suggest the proper shape for powder grains in order to relieve the initial strain and to increase the volume of gas as the space behind the projectile became greater, thereby distributing the pressure more uniformly along the bore. His theoretical charge, which he called a 'perforated cake cartridge,' was composed of disks of compressed powder from one to two inches thick and of a diameter to fit the bore.

General Rodman built the best smooth-bore gun ever made, and experimented with this powder in this gun, fully confirming his theory; but for many reasons it was found to be far more convenient to build up a cartridge of pierced hexagonal prisms, about an inch in diameter, instead of having them the diameter of the bore. This prismatic powder, slightly modified, is now used by all military nations.

There are two general methods for measuring the pressure—viz. the Statical, in which the pressure is placed in equilibrium with a known resistance, a method which is open to objection on account of the magnitude of the force to be measured, and the rapidity of its variation, but which is valuable for determining the maximum pressure at the point where the measurement is made; and the Kinetic, in which the pressure at any instant is deduced from the acceleration given to a known mass; the objections to this method relating to the minuteness of the times to be measured, and to the consequences of small errors in measuring the spaces.

The process of deformation, which is the present *Static Method*, consists in determining with a press the *tarage* (or the law connecting known pressures with observed permanent deformations of similar metallic specimens), and comparing the deformation observed in a similar specimen, which has been exposed to the action of powder gases, with the results of these experiments. The specimen may be deformed by making a cut, which is General Rodman's plan; or by compressing a cylinder between flat surfaces, which is Captain Noble's plan; both methods being adaptable, either within or without the bore. Copper is generally used for the specimen to be deformed, the pressures being exerted through a freely moving piston. The internal gauge is tied to the bottom of the cartridge, or recessed into the face of the breechblock, or into the face of the projectile.

In using the *Kinetic Method*, we determine the rate of change of the pressure from the change in rate of motion of some body (the projectile, the gun, or an auxiliary projectile or piston), the mass of which is known. The Russian General Mayevski (1867) experimented with this method. He used a projectile, to the base of which was attached a rod passing through the breech of the gun and arranged so as to rupture electric currents placed at varying distances along the path of this rod. This apparatus was subject to many errors, but his experiments gave reasonably close approximations to the results obtained by the statical method. The pressure may be advantageously determined from the acceleration of the gun and its recoil, and a great many instruments have been devised for this purpose. General Rodman invented the first, which consisted of a cylinder, rotating with a known and uniform velocity about an axis parallel to that of the gun and close to it. A pointer fastened to the gun, which was hung as a pendulum oscillating in the plane of fire, traced upon the cylinder during the recoil a line the development of which gave the successive accelerations of the recoil. Colonel Sebert (French) replaced the rotary cylinder by a broad steel tape, smoked on one side, against which rested the tines of a tuning-fork set vibrating by the recoil. Colonel Bomford, of the United States Ordnance Department (1841), bored small holes through the walls of a cannon, at right angles to its axis, and placed in each hole a bullet, the velocity of which was measured, thereby furnishing the data for the determination of the pressure at the various points along the bore.

Exterior Ballistics. In exterior ballistics, we determine the path of the projectile, knowing its shape, calibre, weight, its initial velocity of translation and rotation, the resistance it meets from the air, and the action of gravity. To this branch of the science the following definitions would apply:

The *Trajectory* is the curve described by a point on the axis of a projectile in its passage through the air. It is divided into ascending and descending branches, the highest point of flight being called the summit.

By *Rigidity of Trajectory* is meant the important principle, proven analytically, that the whole trajectory, with its chord, may be revolved a certain distance about a horizontal axis passing through the centre of the muzzle, without changing the relations between the trajectory and its chord.

The *Line of Sight* is the line passing through the sights of the piece and the point aimed at.

The *Line of Departure* is the prolongation of the axis of the bore at the instant the projectile leaves the gun; or it is the tangent to the trajectory at the muzzle.

The *Plane of Sight*, sometimes called the plane of fire, is the vertical plane containing the line of sight.

The *Plane of Departure* is the vertical plane containing the line of departure.

The *Angle of Departure* is the angle made by the line of departure with the horizontal plane.

The *Angle of Elevation* is the angle made by the axis of the bore with the horizontal plane when the piece is laid.

The *Jump* is the difference between the angle of elevation and the angle of departure.

Drift is the departure of the projectile from the plane of fire due to the resistance of the air and the rotation of the projectile.

Muzzle Velocity is the velocity of the projectile on leaving the piece.

Remaining Velocity is the velocity at a given point of the trajectory.

Striking Velocity is the remaining velocity at the target.

The *Horizontal Range* is the horizontal distance from the muzzle of the gun to that point of the descending branch of the trajectory (point of fall) which is at the level of the gun. Ordinarily the term range means the distance between the gun and the target.

The *Angle of Fall* is the angle that the tangent to the trajectory at the point of fall makes with the horizontal plane passing through the muzzle.

The *Striking Angle* is the angle made by the tangent with the horizontal plane at the striking-point.

The *Dangerous Space* is the horizontal distance over which an object of a given height will be struck.

Direct Fire is with high velocities and angles of elevation not exceeding about 20 degrees.

Curved Fire is with low velocities and angles of elevation not exceeding about 20 degrees.

High Angle Fire is when the angle of elevation exceeds 20 degrees.

Indirect Fire is when the target is invisible from the firing-point.

HISTORY. The theories relative to the motion of projectiles were originally of the crudest kind. Up to the middle of the Sixteenth Century bullets were supposed to move in right lines from the gun to the target, and shells fired from mortars were thought to describe a path made up of two right lines joined by an arc of a circle. The trajectory was divided into three parts: First, *violent*, which was thought to be a right line; second, *middle* or *mixed*, which was an arc of a circle; and third, the *natural*, which was a right line. In a work on gunnery, published by Niccolò Tartaglia, a Venetian, in 1537, he proved that no part of the path of a projectile could be a right line, and that the greater the velocity of the projectile the flatter is the path of the projectile. In his calculations, he considered the resistance of the air, and found that an angle of 45 degrees gives the maximum range. Tartaglia also invented the gunner's quadrant (q.v.) for giving elevations. Galileo demonstrated the parabolic form of the trajectory *in vacuo* in his *Dialogues on Motion*. Newton's discovery of the law of gravitation made plain the cause of the curvilinear motion of projectiles. By the use of the calculus, his own invention, he determined the momentum transferred from the projectile to the particles of air at rest, which is the method followed at the present day, and which leads to the law of the square of velocity. So far as a rigorous solution of the trajectory in air is concerned, the problem remains to-day about where Newton and Jean Bernouilli left it.

BALLISTIC MACHINES. There are two ways in which the velocity of a projectile may be determined experimentally—by measuring the projectile's momentum, and by actually measuring the time required for the projectile to pass over a given space. The first method is the older; and many years ago, when guns and projectiles were small and velocities were low, the results were sufficiently accurate for practical purposes. Modern gunnery is much indebted to the now discarded *ballistic pendulum* and *gun pendulum*, which have long since been supplanted by the cheaper and more accurate machines using the second method.

The *Ballistic Pendulum* was invented about 1740, by Benjamin Robins, who was the first to make a systematic and intelligent series of experiments to determine the velocity of projectiles. The *whirling-machine*, for determining the resistance of the air to slowly moving bodies of different forms, is also attributed to Robins. The principle of the ballistic pendulum, as well as of Count Rumford's gun-pendulum, is the transformation of the elements of the momentum of the small mass and high velocity of the projectile to the more easily measured large mass and low velocity of the pendulum. The original ballistic pendulum of Robins consisted of a block of wood bolted to a plate of iron, the whole revolving freely about a horizontal axis, the block, when struck by a bullet, recoiling through a certain arc, which was measured by the length of ribbon wound off the reel. This light pendulum could stand the impact of musket-balls only, but with it Robins began the science of gunnery by determining the relations which should exist between the calibre, length of barrel, and charge of powder. Dr. Hutton (1775-91), Dr. Gregory (1814), and Major (later Colonel) Mordecai, of the United States Ordnance Department (1842-45), made many experiments with improved ballistic pendulums.

Major Mordecai used, also, the gun-pendulum, his apparatus being briefly as follows: A ballistic pendulum weighing 9358 pounds, with a cast-iron block made in the shape of a hollow frustrum of a cone, with hemispherical bottom and filled with sand-bags, to receive the projectiles, which were from 6 to 32 pounds in weight. By very delicate bearings and means of mounting, this pendulum, if set in motion through an arc of 12 degrees, would come to rest only after 30 hours. The recoil was measured by a sliding pointer on a brass line. In front of this pendulum was constructed a screen of 2-inch plank, designed to intercept the blast from the discharge, a 12-inch circular aperture being left for the passage of the projectile. The gun itself was mounted as a pendulum, weighing 10,500 pounds, by suspending it from a horizontal axis by means of rods. The remarkable closeness of the results from these two pendulums furnished a conclusive proof of the theoretical correctness of the method employed.

In using the second method, a great variety of ballistic machines have been invented for measuring the very short interval of time required for the projectile to pass over the short space between two given points of its trajectory. In 1767, an Italian instrument-maker, named Mattei, invented a very simple machine for this purpose, consisting of a large paper cylinder revolving around a vertical axis. The principle was this: If a musket-ball be fired horizontally through the axis of the cylinder at rest, the two bullet-holes will be 180 degrees apart on the surface of the cylinder; if, however, the cylinder be revolving at a known rate, the two bullet-holes will be more, or less, than 180 degrees apart, depending on the direction in which the cylinder is revolving, the difference measuring the distance a point on the surface of the cylinder has moved, while the projectile was traveling a distance equal to the diameter of the cylinder. A simple arithmetical calculation gives the desired velocity. This machine was also extensively used, in improved forms, by subsequent investigators with good results. With it General d'Antoni determined the initial velocity of musket and rifle balls with considerable accuracy; the French Colonel Grobert (1803) constructed a modified form of the machine, which was used by members of the French Institute deputized to experiment with the muzzle velocity of musket-balls; Dr. Gregory (1818) gave the machine a more rapid and regular motion by introducing coiled springs and cog-wheels. Colonel Dobooz, of the French Artillery, invented (1818) a machine for measuring velocity depending upon the principle of the law of falling bodies. A movable screen suspended by a cord which passed over two pulleys and down immediately in front of the muzzle, was the falling body; near the movable screen was a fixed screen; two marks were made on the screens at the same height from the ground. When the gun was fired and the cord was cut at the muzzle, the movable screen fell, and both screens were pierced by the bullet (almost) simultaneously. The space through which the screen had fallen when the bullet reached it was shown by the two bullet-holes relatively to the two marks on the screens.

With the methods now in use, the error in determining the time which the projectile requires to pass over, say 150 feet of its path, must be less than one fifteen-thousandth part of a second if we are to have results correct to within one foot per second, when using a velocity of about 1500 feet per second. It is only by using electricity that such great accuracy can be obtained, and all the machines now in use are of this character. There are a great many of these machines differing from each other chiefly in the manner of making a record. Wheatstone, the celebrated English electrician, was the first to suggest the use of electricity for this purpose. At about the same time (1840), Prof. Joseph Henry, of the Smithsonian Institution in Washington, proposed a new method for determining the velocities of projectiles, depending upon the breaking of electric currents. Captain Konstantinoff, of the Russian Artillery, constructed the first electro-ballistic machine after Wheatstone's suggestion, in 1844. But the first really reliable and convenient 'chronoscope' was made about 1850, by Captain Navéz of the Belgian Artillery.

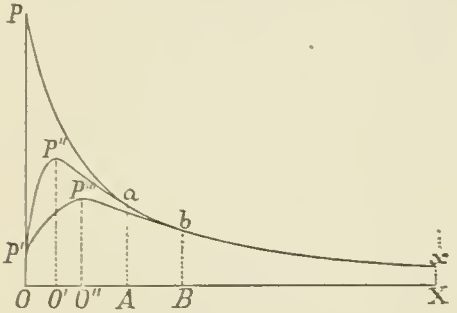
All chronographs, chronoscopes, etc., for ballistic experiments are constructed on these principles: Two vertical screens are placed perpendicular to the plane of fire; one near the gun, and the other a certain distance (s) farther from the gun; each of these screens is connected electrically with the ballistic machine, these connections being severed, in succession by the projectile as it passes through them; the machine records these interruptions, giving the time between them, which is the time (t) taken by the projectile to pass over the distance (s). The velocity of the projectile (v) at the middle point between the screens, is evidently equal to the distance divided by the time ($V=\frac{s}{t}$). The electro-ballistic machines most in use at present, are the Le Boulengé Chronograph, the Bashforth Chronograph, and the Schultz Chronoscope.

This brief and incomplete sketch brings us down to the status of the science at the present day. For the proper presentation of the subject, a large volume scarcely suffices. The manufacturer of guns makes a thorough study of the purposes for which his gun is intended, and builds his machine strong enough to perform the work required of it. In general, it may be said that the great desideratum of the artillerist is to give the projectile a low maximum pressure long sustained, that is, he wants a slow-burning powder and a very long gun.

For making a popular study of ballistics it is best to take a certain gun, already constructed, and regard it as a thermodynamic machine, in which the potential energy of the explosive is to be converted into the kinetic energy of the projectile. In planning a new gun for any purpose, ballistic considerations are of first importance, but this belongs more properly to the subject of Ordnance and Gun Construction. See ORDNANCE.

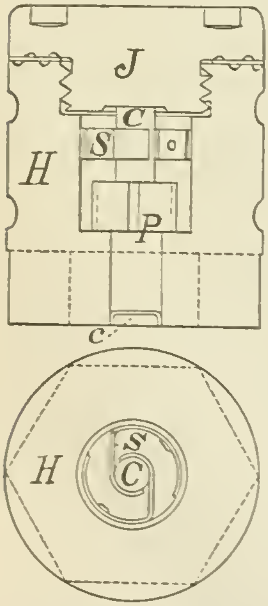
The two quantities which may be actually measured experimentally, in the study of ballistics are the *pressure* in the bore of the gun due to the combustion of the charge, and the *velocity* thereby given to the projectile; the former belonging to interior ballistics, and the latter to both interior and exterior. The transformation of the potential energy of the explosive, into the kinetic energy of the projectile, is accompanied by an enormous pressure on the walls of the gun and the base of the projectile, which pressure we require to know, in order to guard against danger to our machine (the gun), as well as to determine the work which our projectile will accomplish. For lack of suitable measuring instruments, pressures were formerly inferred from the resulting injury to the gun.

The gun being built, the ballistician makes himself thoroughly acquainted with the powder he is going to use, taking into consideration its composition, specific gravity, gravimetric density, form of grain, the laws of its explosion (ignition, inflammation, and combustion)—deducing therefrom algebraic formulas for the burning in air of grains of different shape—size and density of grain, the density of loading, the amount of heat given off, the pressure of the gases, the 'force' of the powder, and many other circumstances too numerous and technical for this article. Assuming the laws of perfect gases (Mariotte's and Gay-Lussac's laws), he deduces from a study of all of the above circumstances formulæ for the motion of the projectile, both inside and outside of the bore, and for the pressure inside the bore at different points. This pressure, which may be graphically illustrated by the pressure curve, and which is called the 'maximum pressure,' when the chamber is full of powder was found, by experiment, to be 40 tons per square inch. By using the equation of this curve, Noble and Abel found that, theoretically, one pound of gunpowder is capable of doing 536.35 foot-tons of work. This work is not all done on the projectile: some of it is used up in the recoil of the gun, some heating the gun and projectile, and some is lost in other ways. The 'factor of effect,' for instance, for the English 8-inch gun is about 0.83: or 83 per cent. of the actual work done by the fired gunpowder is available for putting energy into the projectile. M. Emile Sarrau, a noted French engineer of explosives, has deduced the equation of motion of the projectile in the bore of the gun. Noble and Abel have made a very close approximation to the pressure-curve in guns, as has also General Mayevski, by a different method: but the problem has never been accurately solved.



PRESSURE CURVE.

OP—Axis of Pressures; OX—Axis of Bore of Cannon; OP—Pressure if the charge burned instantaneously; OP'P'' a b x—Curve of quick-burning powder; OP'P''' b x—Curve of slow-burning or cocoa powder.

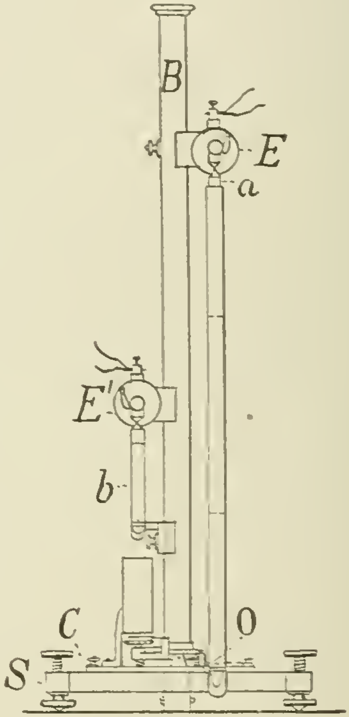


NOBLE PRESSURE-GAUGE.

P—Piston; H—Housing; S—Spring; C—Cylinder; J—Closing-plug.

When firing for ballistic purposes, one or more *Noble pressure-gauges* are placed in the bore behind the cartridge. This instrument consists of a piston, moving in a cylindrical channel, and a copper cylinder to be compressed, which is in contact with the piston: the cylinder is central and kept in the axis of the housing by a spring. The change in length of this copper cylinder registers the maximum pressure of the powder, which is read off directly by an instrument specially designed for this purpose, called a calipher.

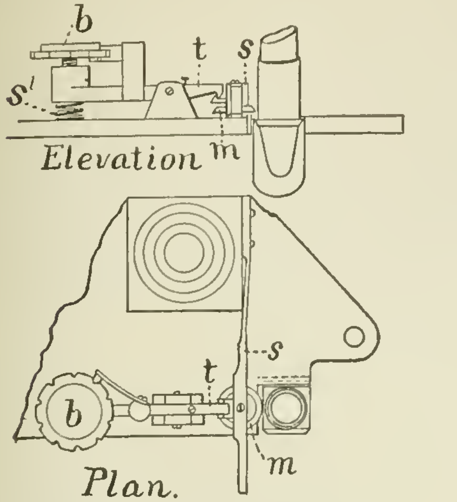
The velocity of this same shot is measured by the Le Boulengé Chronograph, or some similar instrument. The Le Boulengé Chronograph consists of two rods suspended vertically from electromagnets, each having its own current and its own target, and being independent of the other. The first target being broken, its magnet is demagnetized and its rod falls. The second target being broken, its magnet is demagnetized, and the falling of its rod releases a marking-knife, which makes a mark on the first rod, while it is falling. A simple application of the laws of falling bodies furnishes the scale of time.



LE BOULENGE CHRONOGRAPH.

a and b—suspended rods; E and E'—electro-magnets; B and S—stand with leveling-screws; O—marking-knife.

The forces acting on the fired projectile are the propelling force of the powder, modified by the rotating force caused by the bands and grooves: the action of gravity: and the resistance of the air. The exact resulting motion is very complex, but may be stated in general terms as follows: The propelling force of the powder tends to drive the projectile forward, in a straight line, in continuation of the axis of the bore; the action of gravity tends to pull the projectile downward, in a straight line, toward the centre of the earth; the resistance of the air, combined with the action of gravity and the rotation of the projectile, causes the axis of the projectile to describe a cone about the tangent to the trajectory, and forces the projectile to the right out of the plane of fire. From this we see that the trajectory is a curve of double curvature; the trajectory which we ordinarily consider, being the projection of the actual curve on the plane of fire. The resistance which the projectile meets from the air depends upon the form and cross-section on the projectile, the density of the air, and the velocity of the projectile. It has been found from experiment that the ogival head of two to three calibres' radius offers less resistance than any other. The resistance of the air varies directly with the area of cross-section of the projectile. The inherent resistance which the air offers to the motion of the projectile depends upon the density and movements of the air—the density depends upon the temperature, the amount of moisture, and the barometric pressure; the effects of the movement of the air depend upon the direction and velocity of the wind. To make a proper study of the resistance of the air, we use a thermometer to measure the temperature; a barometer to measure the weight or pressure of the air; an anemoscope (wind-vane) to find out the direction of the wind; an anemometer to determine the velocity of the wind; and a psychrometer to determine the humidity.



MARKER OF LE BOULENGÉ CHRONOGRAPH.

t—trigger; s—spring; m—marking-knife; b—pan for catching short rod; s'—spring.

The relation between the velocity of the projectile and the resistance of the air is a very complicated one, and must be studied in text-books on the subject. The Rev. Francis Bashforth made a series of very valuable experiments upon this subject between 1865 and 1880, using a very accurate instrument and comparatively modern projectiles, from which he concluded that the resistance varies with some power of the velocity, and that this power varies with the velocity, being generally as follows:

Velocities between 900 and 1100 feet per second	V^6
Velocities between 1100 and 1350 feet per second	V^3
Velocities above 1350 feet per second	V^2

These results have not been materially changed by subsequent experiments. The most recent and now generally used experiments are those made at Krupp's in 1881, and discussed by General Mayevski, who deduced valuable, but complicated, formulas for resistance and retardation as a function of the velocity.

BALLISTICS OF PENETRATION. In ballistics of penetration, we determine the effect on the target, knowing the energy and inclination with which the projectile strikes, the resisting powers of the material of the target, etc. Because it has been longer in the service, and more experimented upon than any other, most of the formulas for penetration are deduced for wrought-iron armor, on one of two suppositions: First, that the projectile, acting as a punch, separates a disk of metal from the plate; and second, that the projectile, acting as a wedge, forces the particles of metal apart. The Fairburn, English Admiralty, and the Muggiano formulas are based on the first supposition, and the de Marre, Maitland, Krupp, and Gavre on the second. For steel armor the unsatisfactory method was formerly used of calculating the penetration by the wrought-iron formulas, and adding a certain percentage of increase of resistance, varying from 10 to 30 per cent. In modern Harveyized plates penetration seldom occurs, owing to the hard face of the plate, unless the gun greatly overmatches the plate. To give an idea of what the penetration really is, Captain Orde-Browne's rule may be quoted: "The penetration of a projectile in wrought-iron armor is one calibre for every 1000 feet of striking velocity." For example, a 12-inch projectile striking with a velocity of 2000 feet per second, should penetrate 24 inches of wrought iron. See ARMOR PLATE.

Ballistic Tables consist of the tabulated value of the space, altitude, inclination, and time functions of the velocity.

These functions, together with various auxiliary data, are calculated and tabulated for all practicable ranges and velocities, and for all the guns in service.

Those desiring further information on the subject of ballistics, are referred particularly to the works of Colonel Ingalls, of the U. S. Artillery Corps, who is one of the greatest living authorities on ballistics; these may be found in the *Artillery Circulars* published by the United States War Department. The bibliography available includes: Ingalls, *Interior Ballistics* (New York, 1886); McKinley, *Text-Book of Gunnery* (England, 1887); Noble and Abel, *Experiments on Fired Gunpowder* (England, 1880); Meigs and Ingersoll, *Interior Ballistics* (U. S. Naval Academy, 1887); Bruff, *Ordnance and Gunnery* (New York, 1896); Mayevski, *Traité de balistique intérieure* (Saint Petersburg, 1870); Longridge, *Internal Ballistics* (New York, 1887); Glennon, *Interior Ballistics* (Baltimore, 1894). Other authorities on the subject are: Siacci, Otto, Bashforth, Nivens, Sladen, Sarreau, Hojel, Hutton, Robins, Piobert, Morin, and Didion.

For the practical questions involved in the actual construction of guns and carriages, the reader should consult the article ORDNANCE, where the process of manufacture and assembly is described. See also GUNNERY: ARMOR PLATE; ARTILLERY: EXPLOSIVES, and similar articles.

BAL'LISTITE. A form of gunpowder of which the chief constitutent is nitro-glycerine. See GUNPOWDER: and EXPLOSIVES.

BALL NOZ'ZLE. See HYDRODYNAMICS.

BALLOONS'. See AËRONAUTICS.

BAL'LOT (Fr. *ballotte*, It. *ballotta*, dim. of *balla*, a ball). Primarily, a little ball, used in the practice of secret voting. Secret voting is thence called 'voting by ballot,' whether it be a ball, a ticket, or a mechanical device that is used for the purpose. Wherever the practice of deciding questions by vote has obtained, some form of secret voting has always been found necessary in order to insure untrammeled action by the voter. The dicasts in Greece voted secretly by means of balls, stones, or shells with marks. From this use of marked shells (Gk. *ostrakon*, a shell), in popular voting came the so-called *ostracism*, or secret vote of the people, by which they drove into exile those who became obnoxious to them. *Tabellæ*, or tickets, were chiefly used by the Romans. If the vote concerned a change in the law, the tickets were marked V. R., the initial letters of the words 'Uti Rogas,' expressing assent to the proposer's proposition; and A. for 'Antiquo,' expressing adherence to the old law. If the vote concerned the election of candidates to a public office, then the tickets bore the names of the candidates. The system of secret voting in Rome was fixed by various laws, of which the Lex Gabinia, B.C. 139, was the first: but the popular assemblies voted by ballot as well as by acclamation long before the passing of these laws. These ancient forms of secret voting continued into the Middle Ages, and especially the method of voting by colored balls, from which the usage takes its name. Balls may be used in voting in various ways: e.g. the voter may deposit a ball in either of two boxes, so conjoined that no one shall be able to say into which he drops it; or he may be presented with two balls —a white and a black—and so drop one of them into a box that it shall be unknown which he used. This original form of balloting is still employed in the election of a Pope by the College of Cardinals, and commonly in voting on the question of the admission or rejection of members of private clubs.

In modern times, however, the most common form of ballot has been the written or printed ticket. In the New England Colonies the practice of voting 'by papers' was in vogue from the very first, and there is some reason to suppose that some of the Puritans had become familiar with that usage in Holland or elsewhere on the Continent. The ballot has been occasionally employed in legislative assemblies. It was used in the Venetian Senate; and in Great Britain it was first called for, not for the purpose of elections, but of protecting the independence of members of Parliament in their votes on proposed legislation. After the Restoration, in 1660, it was used for purposes of ostracism in the Scottish Parliament. In 1710 a proposal for secret voting was carried in the English House of Commons, but rejected by the Lords. From 1840 to 1845 the ballot was in use in the French Chamber of Deputies. But the idea of secret voting in deliberative and legislative assemblies responsible to the people is now universally abandoned, as inconsistent with the fundamental principles of popular government, of which publicity and the free criticism rendered possible by publicity are the great safeguards.

Toward the end of the Eighteenth Century vote by ballot for elections to the British Parliament was advocated by some of the Whigs; and it was one of the first things demanded by English Reformers at the beginning of the Nineteenth Century, the followers of Bentham being specially earnest in advocating it. It stood in the original draft of the Reform Bill of 1832. Grote first proposed it in 1833, and renewed the motion every year till 1839. It was one of the six points of the Chartists. In 1851 the proposal of vote by ballot was carried in the Commons against the opposition of Lord J. Russell and the Liberal Government of that time by a majority of 51. The report of a select committee of the House of Commons in 1869 greatly contributed to decide public opinion in favor of the ballot as a necessary safeguard against corruption, intimidation, disorder, and all sorts of undue influence at elections. The result was Mr. Forster's Ballot Act of 1872, which introduced secret voting at all parliamentary and municipal elections except parliamentary elections for universities. It had already been adopted for school-board elections in 1870. With the introduction of the ballot at parliamentary elections, the public nomination at the hustings, which had been so often associated with rioting and violence, disappeared.

Voting by printed ballot is now the method generally employed in elections in countries where constitutional government exists. The ballots may be furnished by the candidate for office, the political party engaged in promoting his election, or by the Government. The first or the second of these plans has usually been adopted in local and general elections in the United States. But the fact that several officers—whose names may conveniently appear on a single ballot—are usually to be voted for at the same election, the great cost of printing and distributing the ballots to multitudes of voters, and the organization of party 'workers' requisite for this work of distribution, have combined to render it impracticable, usually, for the individual candidate to supply the voters with ballots bearing his name, and to throw that burden upon the political party. Hence the 'party ballot,' which has done so much to build up the great party organizations in this country, and which has been a prolific source of corruption, fraud, and intimidation of the individual voter.

These defects of the 'party ballot' in the last few years of the Nineteenth Century produced a widespread public sentiment in favor of ballot reform, which in many of the United States resulted in the adoption of the third plan above referred to—namely, the printing and distribution of the ballots by the State. With some modifications, due to local conditions or to the efforts of party managers to derive a partisan advantage from the system, the form commonly employed is the 'official' or 'Australian ballot,' so called from the fact that it was first employed with success in some of the Australian commonwealths. Its distinguishing feature is the arrangement of the names of all the candidates for a given office, whether nominated by party organizations or by independent effort, in order on the ballot, the voter indicating his choice by some mark written by him opposite the name of his chosen candidate. The usual and preferable form of the official ballot is the 'blanket ballot,' in which the names of all the candidates for an office are arranged in alphabetical order, irrespective of party affiliations. In a few of the United States, however, the practice of arranging the candidates in party columns, each column headed by an emblem—as an eagle or a star—has been adopted. This device is justified as a concession to the necessities of the illiterate voter, who may, by placing his mark at the head of a party column, cast a vote for all the candidates of that party, instead of choosing, out of an alphabetical list, the names of the individual candidates favored by him. This form of ballot is greatly favored by the political organizations for the reason—which constitutes the chief indictment of the method—that it tends to promote 'straight' party voting and to discourage the practice of independent voting. Certain novel mechanical devices for insuring secret voting and for obviating the more serious objections to the use of the printed ballot will be described under the head of Voting-Machine.

For a description of the process by which the State has assumed the regulation of elections, and for an exposition of the laws which have been enacted for securing the purity of the ballot, see Election; Electoral Reform; Corrupt Practices; Primary Elections; Vote; Voter; Suffrage, and the authorities there referred to.

BALLOU, bȧ-lōō′, Hosea (1771-1852). An American clergyman and one of the founders of the Universalist denomination in this country. He was born at Richmond, N. H.; after scant schooling he began to preach in 1793, and became a pastor at Dana, Mass., in 1794, and at Barnard, Vt., in 1803. From 1807 to 1815 he was minister of the Universalist congregation at Portsmouth, N. H., and from 1817 until his death was in charge of the Second Universalist Society of Boston, Mass. In 1819 he established the *Universalist Magazine*, and in 1831 the *Universalist Expositor*. He took a most active part in formally organizing the denomination, in extending its work, and in adding to its literature. He was also known as an eloquent pulpit orator, and was much in demand for special celebrations. From John Murray, the first preacher of Universalism in the United States, he differed in the entire rejection of the so-called Calvinistic theology. Chief among his publications are *Notes on the Parables* (1805), *Treatise on the Atonement* (1807), and *The Doctrine of Future Retribution* (1834). For an account of his life and doctrines consult biographies by T. Whittemore, 4 vols. (Boston, 1854-55), and O. F. Safford (ib., 1889).

BALLOU, Hosea (1796-1861). An American clergyman, the grand-nephew of Hosea Ballou, of Boston. He was born in Vermont; was pastor in Connecticut and Massachusetts, and in 1853 became first president of Tufts College. He was one of the editors of the *Universalist Magazine*, now published under the name of *The Trumpet*. He was the author of *Ancient History of Universalism*, and edited a translation of Sismondi's *History of the Crusades* (Boston, 1833). A *Biography of the Rev. Hosea Ballou* was written by M. M. Ballou, his son.

BALLOU, Maturin Murray (1820-95). An American journalist, born in Boston, Mass. He founded *Gleason's Pictorial*, the first American illustrated weekly; and was successively editor of *Ballou's Pictorial*, *The Flag of Our Union*, *Ballou's Magazine*, and the Boston *Globe*. He published *Due West; Due South; History of Cuba* (Boston, 1854); and a *Biography of the Rev. Hosea Ballou*, his father.

BALL'S BLUFF. A locality on the Potomac, 33 miles northwest of Washington. Here, on October 21, 1861, during the Civil War, 1900 Federal soldiers of McClellan's Army, under Col. E. D. Baker, were overwhelmingly defeated by about 3000 Confederates under General Evans, the latter fighting from the shelter of a thickly wooded grove. The Federals lost about 1000 in killed, wounded, and prisoners, Colonel Baker falling during the engagement; while the Confederates lost only 150. The disaster was due to the blundering generalship of McClellan and his division commander, Stone. The latter was arrested by order of the Secretary of War and imprisoned for six months in Fort Lafayette. Consult Johnson and Buel (ed.), *The Battles and Leaders of the Civil War* Vol. II. (New York, 1884).

BALLSTON SPA, bąl′ston spä. A village, the county-seat of Saratoga County, N. Y., 6 miles southwest of Saratoga Springs, on the Delaware and Hudson Railroad (Map: New York, G 2). It has some reputation as a summer resort and is widely known through its mineral springs. The water flows from a depth of 650 feet, through a tube bored into the solid rock, and is highly effervescent. The village has a large tannery, and pulp and paper mills. Settled in 1787, Ballston Spa was incorporated in 1807. Town-meetings are held every two years, and charter elections annually. The board of education, as well as the village president and board of trustees, is chosen by popular vote. The water-works are owned and operated by the village. Population, in 1890, 3527; in 1900, 3923.

BAL′LYME′NA (Gæl., middle town). A town and important railway centre of County Antrim, Ireland, on the Braid, 33 miles northwest of Belfast (Map: Ireland, E 2). It lies in a densely peopled and well-cultivated district, has agricultural and iron-mining industries, and manufactures of linen, especially brown linen. The United States is represented by a consular agent. Population, estimated, 8700.

BAL′LY TREE. See Black Bully.

BALM, bäm (for derivation, see Balsam). *Melissa officinalis*. An erect, branching, perennial, herbaceous plant one to two feet high, of the natural order Labiatæ, a native of the south of Europe, naturalized in England, and escaped from gardens in the United States. It has ovate, crenate leaves, and axillary one-sided whorls of white or pale yellow flowers. The whole plant has an agreeable, lemon-like smell, on account of which it is frequently cultivated in gardens. It is a valuable honey-producing plant and is sometimes grown for bee forage. Balm is employed for making an agreeable and somewhat exhilarating beverage called Balm Wine. The leaves and tops are used in medicine under the name of Melissa, or Balm. For medicinal use, the herb should be cut before the appearance of the flowers, which begin to expand in July. It is nearly inodorous when dry. The taste is somewhat austere and slightly aromatic. Balm has scarcely any therapeutic value. The quantity of oil contained in it is not more than sufficient to communicate a pleasant flavor to the infusion, which forms an excellent drink in febrile complaints, and when taken warm tends to promote the operation of diaphoretic medicines. A variety of the common catmint (*Nepeta cataria*), with a smell like that of Balm, is often mistaken for it. Moldavian Balm (*Dracocephalum Moldavicum*) is a native of the country from which it derives its name, and of Siberia, etc.: an annual plant, having, when fresh, a smell like that of Balm, but less pleasant. It is much used in Germany for flavoring. Bastard Balm (*Melittis melissophyllum*), a native of the south of England and of many parts of Europe, is a very beautiful plant, which, when dried, has a delightful fragrance and retains it long. In the United States *Collinsonia Canadensis* is called Horse-Balm; and *Monarda didyna*, Tea-Balm. All these are of the natural order Labiatæ.

BALMACEDA, bäl′mȧ-sā′ᴅȧ, José Manuel (1840-91). A Chilean statesman. He was born at Santiago, studied there at the Seminario Concilias, became a leader in the Liberal Club de la Reforma, and in Congress rose to be parliamentary chief of the Progressive party. In 1882 he was appointed Minister of the Interior, and in 1885 Minister of Foreign Affairs. He was elected President in 1886, and forthwith inaugurated an era of public improvement, during which laws were liberalized, railroads were built, and the system of public education was widely extended. Nevertheless, this policy eventually alienated from him all save those directly interested in office. In 1890 he was suspected of scheming to effect the election as his successor of Señor San Fuentes, a politician generally distasteful to all parties, and occasion was thus afforded for open dissatisfaction. When he had thereupon proceeded to appoint an unpopular ministry and dissolve Congress, a revolutionary junta was formed and civil war began (January 7, 1891). After the utter defeat of the Government troops near Valparaiso (August 7), Balmaceda sought refuge in the Argentine Legation, Santiago, where, on September 18, he committed suicide. See Chile, section on *History*.

BALME (bälm), Col de (OF., neck or gorge of balsam). A mountain pass in the Alps, situated on the frontier of France and Switzerland, in the northern part of the Mont Blanc system, through which passes the bridle-path from Chamonix to Martigny. It lies at an altitude of 7221 feet. It is noted for its fine view.

BALMES, bäl′mĕs, sometimes written **BALMEZ**, Jaime Luciano (1810-48). A Spanish ecclesiastic, philosopher, and publicist, born at Vich, Catalonia. After studying at the University of Cervera he became a priest (1833), but passed his life in teaching, travel, and study. His fame rests upon his *El Protestantismo comparado con el Catolicismo en sus relaciones con la civilizacion europea* (6th ed., Madrid, 1875; orig. Barcelona, 2d ed., 1844-45; Eng. trans. from the French, Paris, 1842-44, London, 1849; 10th ed., Baltimore, 1868), which is a very able defense of the Roman Church. Other writings of his (in English translation) are *The Foundations of Religion Explained* (London, 1858) and *Letters to a Skeptic on Religious Matters* (Dublin, 1875). For his biography, consult Blanche-Raffin, *J. Balmez, sa vie et ses ouvrages* (Paris, 1849).

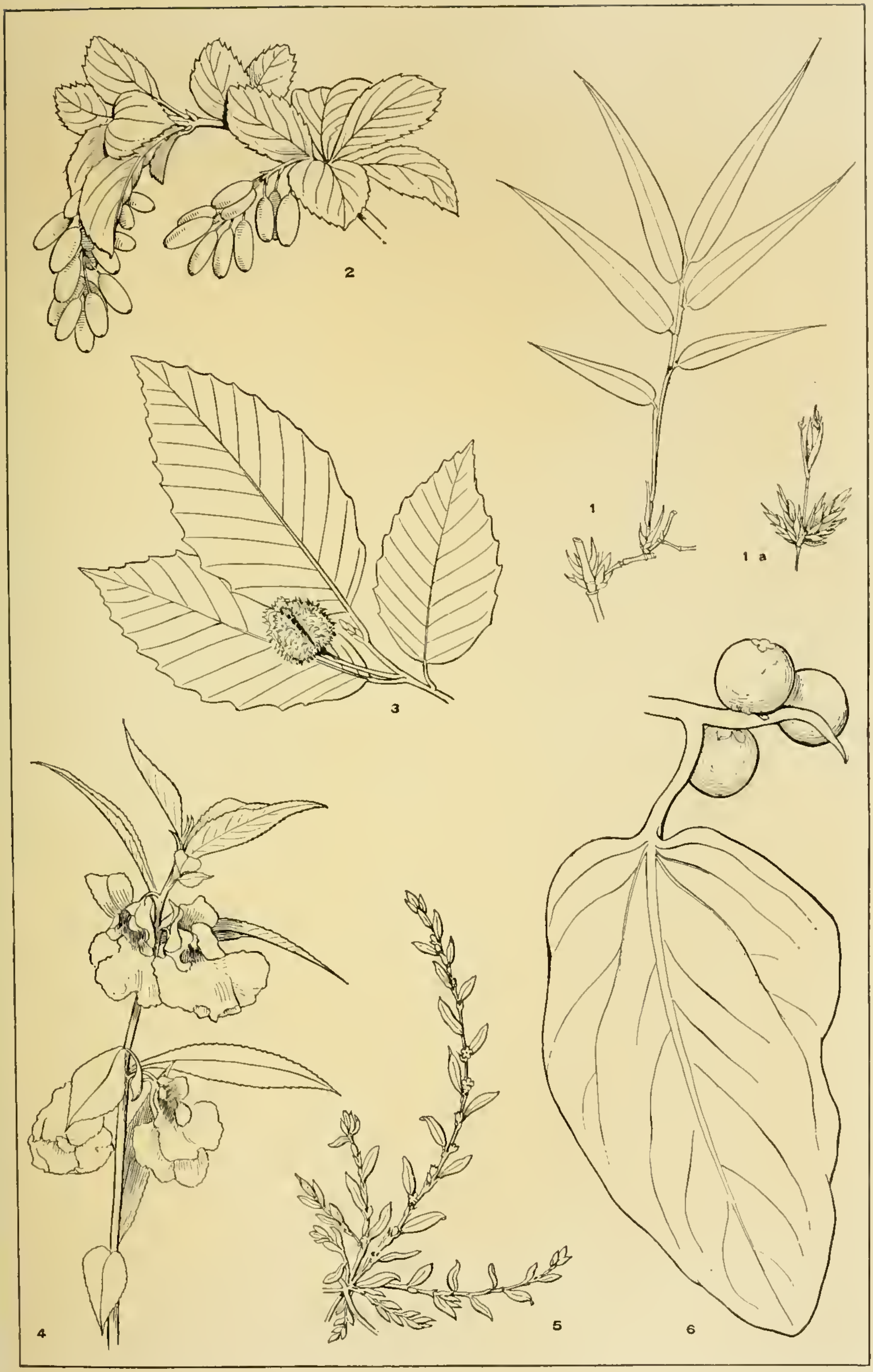
BALM-OF-GILEAD. See Balsam.

BALMORAL (băl-mŏr′*al*) **CASTLE** (Gæl. *baile*, dwelling, town + *morail*, majestic). A royal residence situated on the river Dee, about a mile west of Crathie in West Aberdeenshire, Scotland (Map: Scotland, E 2). The estate, which now comprises 40,000 acres of beautiful grounds, was purchased by the Prince Consort in 1848, and received subsequent additions. In 1853-55, the old building, not being large enough, was replaced by a handsome granite castle built in the Scottish baronial style, and furnished and decorated in accordance with Highland tastes. The castle consists of two separate blocks of buildings united by wings and a massive tower 35 feet square, rising to a height of 80 feet, surmounted by a turret 20 feet high. It has a straggling rather than an imposing appearance, but commands a magnificent prospect. It was the autumnal residence of Queen Victoria, and the cairns which crown most of the hills around are memorials of her friends. Balmoral is the occasional residence of Edward VII. and Queen Alexandra, who effected important alterations in its interior decorations and furnishings. The castle can be visited by special order, when the royal family is not in residence.

BALMUNG, bäl′mụng. The name of Siegfried's sword in the *Nibelungenlied*. Originally the ancestral blade of the Nibelungs, it was presented to him by the generous Shilbung and Nibelung, whom straightway he thanklessly slew.

BALNAVES, băl-năv′ĕs, Henry (?-1579), of Halhill, a Scottish reformer. He was born at Kirkcaldy in Fifeshire, and educated at Saint Andrews and at Cologne, where he was imbued with the teachings of Lutheranism. On his return to Scotland, he studied law. James V. made him a senator of the College of Justice in 1538, and when Arran took up the regency, he was made deputy-keeper of the privy seal (1542). In the following year he was imprisoned for a time on account of his Protestantism, which became all the more active by these attempts at repression. Suspected of complicity in Cardinal Beaton's murder, he was declared a traitor and excommunicated. He fled to the castle of Saint Andrews, and when it was captured by the French was sent to France with Knox and others as a prisoner of war. Here he wrote a treatise on justification, which was published after his death by Knox, with a laudatory preface, under the title of *The Confession of Faith* (Edinburgh, 1584; reprinted, London, 1831). When Mary of Guise assumed the regency in 1556, Balnaves's forfeiture was rescinded. He returned to Scotland and took an active part in public affairs, as a commissioner to settle the Treaty of Berwick (1559-60) and to revise the Book of Discipline (1563), and as an assessor with the regent Murray to inquiry into the charges against Mary in connection with Darnley's murder (1568). He

BALSAM, ETC.



1. BAMBOO (Bambusa vulgaris); *a*, Tip of a female flowering stalk.
2. BARBERRY (Berberis vulgaris).
3. BEECH (Fagus sylvatica).
4. BALSAM (Impatiens balsamina).
5. SMART WEED or KNOT WEED (Polygonum aviculare)
6. BANYAN (Ficus benghalensis).

died in 1579. For his biography consult Rogers, *Three Scottish Reformers* (London, 1874).

BAL′NIBAR′BI. One of the countries mentioned by Swift in his *Gulliver's Travels.*

BALSA, bäl′sȧ (Sp., Port., from Peruv. *balza,* a light wood, of which rafts are made). A raft or float, used originally for carrying passengers across a river or for landing in the surf. It consists of two floats—commonly made of logs from the balsa-tree, the wood of which is almost as light as cork—separated a short distance from each other and held in that position by a framework. It has been used in South America for centuries; it sometimes consists, as on the coast of Brazil, of several sharpened logs held together by slats; and, used by fishermen, is often met far out at sea. On the western coast of South America balsas are made of bullock-hide sewn together over a framework to form a body of nearly circular section, pointed and turned up at the ends; two of them are joined together by a framework to which they are lashed. The balsa must be regarded as a development of the raft principle, and is analogous to the pirogue, proa, banca, catamaran, and other out-rigger boats of Asia and the Pacific islands. The balsas used in the navy are composed of two floats joined by a framework, over which are laid slats about an inch apart. Each float is about 10 feet long, of oval section, but somewhat flattened on top and tapering slightly from the centre toward the ends, built up of staves and banded like a barrel. The width of naval balsas is about two-thirds the length. Larger sizes have been issued, but they are not now supplied. The 'india-rubber balsa' has been used on shipboard more or less since 1837, but since the advent of collapsible boats its use has decreased. It is composed of two or more cylindrical, air-tight bags, with apparatus for inflating them, and a framework and raft-body to hold them together and afford a platform for passengers or freight. It is comparatively light and portable, but takes up much deck room, and the rubber deteriorates rapidly.

BALSAM, bạl′sam (Lat. *balsamum,* Gk. *βάλσαμον, balsamon,* resin of the balsam tree, the tree itself). A name formerly comprehending many resinous substances and oils, to which important medicinal virtues were ascribed, as well as of medicines compounded of resins and oils. When the term balsam is now used without addition, the balsams of Peru and Tolu are generally intended. These two balsams are very similar in all their more important properties, and are both produced by trees of the genus Myroxylon, of the natural order Leguminosæ, natives of the tropical parts of America. *Myroxylon peruiferum,* which is called the Quinquino, a beautiful tree, common from Peru to Mexico, is generally regarded as the species which produces the balsam of Peru; and *Myroxylon toluiferum,* a very similar species, found in the forests of Tolu, the banks of the Magdalena, etc., as that which produces the balsam of Tolu; but it is doubtful if the difference is not at least as much owing to the modes of procuring and preserving the balsam; and other species of the same genus (*Myroxylon Pereiræ* and *Myroxylon pubescens*) are supposed also to yield it. Balsam of Peru appears in two forms, white and black. Some claim the white is from the pods, the black from the tree-trunk; others say the differences are due to methods of preparation. The actual evidence is insufficient to determine these points with certainty, and it is not improbable that different methods may be employed. Both balsams have a very fragrant odor. They are used in confectionery to impart a flavor like that of vanilla; also in perfumery, and for pastilles, etc. In medicine, they are administered as gentle stimulants and tonics, and particularly in chronic bronchial affections. Tolu lozenges are a popular and pleasant remedy for troublesome coughs. These balsams are also used for cleansing ulcers. They contain cinnamic acid, a peculiar oily substance which has been called *cinnamein,* also known as Oil of Balsam of Peru, resins, benzoic, acids, tolene, etc. The name white Balsam of Peru is sometimes given to a balsamic substance which flows from the *Liquidambar styraciflua.* See LIQUIDAMBAR.

The name Balm of Gilead is generally applied to a liquid resinous substance, which has long enjoyed a very high reputation in the East, being prized not only for its fragrance, but also for the medicinal virtues which it is supposed to possess. It is the subject of several allusions in the Old Testament, which strongly indicate the prevalent opinion of its preciousness; and is celebrated by Strabo, Pliny, Diodorus Siculus, and other ancient writers as a cure for almost every disease. It is generally believed to be produced by a species of Commiphora—a small tree growing in Arabia and Abyssinia, and known as *Commiphora opobalsamum.* The finest balsam, called Opobalsam, or Balm of Mecca, is obtained by incisions; at first turbid and white, it finally becomes of a golden yellow color, and of a consistence like honey. Inferior kinds are obtained by boiling the fruit and the wood. Balm of Gilead is irritating when applied to the skin, and is believed to resemble Balsam of Copaiva in its effects upon the human system.

Other substances, sometimes designated balsams, and possessing a somewhat similar fragrance, are produced by different species of Burseraceæ. Among them is one called South American balm of Gilead, the product of a tree called *Protium carana.* Balsamic substances are furnished also by a number of species of Clusiaceæ—Balsam of Umiri, a fragrant yellow fluid, by *Humirium floribundum,* a South American tree. Canada Balsam is a kind of turpentine obtained from the Balm-of-Gilead Fir (*Abies balsamea*); Hungarian Balsam, from the Mugho or Mountain Pine (*Pinus pumilio* or *mughus*); and Carpathian Balsam, from the Stone Pine (*Pinus pinea*). (See FIR and PINE.) Balsam of Copaiva is the produce of different species of *Copaifera.* (See COPAIBA.) A variety of *Populus balsamifera* is known in the United States as the Balm-of-Gilead tree.

BALSAM (*Impatiens balsamina*). An erect, semi-succulent annual, native of India, and cultivated in flower-gardens for more than 300 years. Many varieties have arisen through cultivation and selection. The double sorts are known as camellia-flowered varieties. The plant grows from 1 to 2½ feet high, and branches freely. The flowers are axillary, and vary in color from white and yellow to dark red. The plant is of easy culture. Seed may be sown in the open, or plants started in pots and planted out after danger of frost is past.

BALSAM APPLE. See MOMORDICA.

BALSAMO, bäl′så-mō, JOSEPH. See CAGLIOSTRO.

BAL′SAMODEN′DRON. See MYRRH.

BALTA, bäl′tå. A town in the Government of Podolia, Russia, situated on an affluent of the Bug, about 210 miles southeast of Kamenetz-Podolski, the capital of the government (Map: Russia, C 5). It is poorly built and very filthy. It is connected by rail with Odessa. The chief articles of its commerce are grain, cattle, and some manufactures. It holds two annual fairs. Population, in 1897, 24,400, 75 per cent. of which are Jews. Formerly a Turkish possession, it was ceded to Russia by the Treaty of Jassy in 1791.

BALTA, JOSÉ (1816-72). A Peruvian soldier and statesman, President of Peru in 1868-72, born at Lima. In sundry revolutions he won military distinction, and in 1855 he withdrew from the army with the rank of colonel. In 1867 he was one of the leaders of the insurrection which drove into exile (January, 1868) the dictator Prado. In 1872 he was shot by order of the Minister of War, General Gutierrez, who had instituted a military mutiny.

BALTARD, bål′tär′, LOUIS PIERRE (1765-1846). A prominent French architect and engraver. He was professor of architecture at the Ecole Polytechnique in 1796, was architect of the Pantheon under the Empire, and supervisor of prisons and markets, 1815-18. He held, after 1818, a professorship at the Ecole des Beaux-Arts, and was, after 1837, general inspector of Paris monuments. Among the buildings designed by him were the prison and arsenal at Lyons. He published several works, and was engraver for the great work on Egypt issued by order of Napoleon.

BALTCHIK, bäl-chēk′ (probably ancient *Melissa*). A seaport of Bulgaria, situated on the Black Sea, about 24 miles northeast of Varna (q.v.) (Map: Balkan Peninsula, G 3). It has a well-protected harbor and is the seat of a considerable trade in agricultural products. Population, in 1893, 5137, consisting chiefly of Turks, and for the rest, Bulgarians, Tartars, and Greeks.

BALTHAZAR, bäl-thā′zẽr. (1) A character in Eichberg's opera of *The Doctor of Alcantara*. (2) Belshazzar, 'which that highte Balthasar,' in Chaucer's *Monk's Tale*. (3) One of the Wise Men of the East. (4) The name of several minor characters in plays of Shakespeare.

BALTHINGS, bäl′tĭngz. The royal family from which the Visigoths chose their kings, while the Amelings, the old royal line of the Goths before the division, continued to rule the Ostrogoths.

BALTIC (ba̤l′tĭk), BATTLE OF THE. See COPENHAGEN.

BALTIC PROV′INCES. A term comprehending three Russian governments bordering on the Baltic—viz. Courland, Livonia, and Esthonia (Map: Russia, C 3). Area, 36,560 square miles. Population, in 1897, 2,387,000. The great bulk of the population consists of Letts and Esths, the former akin to the Lithuanians, the latter a Finnish race. The higher classes, nobility and burghers, are Germans, who constitute about seven and a half per cent. of the total population of the three governments. The number of Russians is still insignificant. The Knights, Swordbearers, and Teutonic Knights subjugated the Letts in the Thirteenth Century, planting German civilization and Christianity with fire and sword. The inhabitants are nearly all Protestants. Although the soil is not very fertile, agriculture is in a flourishing condition, owing to the improved methods of cultivation and a generally higher intelligence of the people. Commerce and manufactures are also highly developed, favored as they are by the proximity of the Baltic. For further details, see articles on the separate governments.

The Baltic Provinces once belonged to Sweden, except Courland, which was a dependency of Poland. The Swedish provinces came into the possession of Russia in the beginning of the Eighteenth Century through the conquests of Peter the Great, and Courland was acquired in 1795. Peter the Great conceded to the provinces their own administration and guaranteed the inhabitants freedom of conscience. These rights were confirmed anew in 1856, but in spite of this a systematic attempt has been made by the Russian Government, especially since 1880, to assimilate the provinces with the rest of the Empire. The Greek Church has endeavored to proselytize the people, the Russian language has been substituted for the German in the schools and courts, and the press has been subjected to censorship. These measures have aroused great discontent in the Baltic Provinces; not so much, however, among the masses of the people as among the German nobility, who, though constituting but a small fraction of the population, exercise great power over the peasantry. The attitude of the Russian Government toward the German provinces is dictated by the general policy of Russification which has been followed in the case of the Jews and of Finland (q.v.).

BALTIC SEA. The inclosed sea in northern Europe, bounded by Germany, Denmark, Sweden, and Russia, and communicating with the North Sea through a series of winding channels known as The Sound, Great Belt, Little Belt, Kattegat, and Skagerrak. From the peninsula of Denmark, which may be regarded as its western limit, the Baltic extends eastward to the frontier between Germany and Russia, and thence northward to about latitude 66°. The greatest length of the Baltic from Lübeck in Germany to Haparanda in Sweden is about 930 miles, while its breadth varies from an extreme of 425 miles (Stockholm to Saint Petersburg) to less than 50 miles at the southern extremity. It covers an area of about 160,000 square miles. The northern extension includes three large bays or gulfs, the Gulfs of Riga and Finland, indenting the coast of Russia, and the Gulf of Bothnia between Russia and Sweden. On the coast of Germany are smaller indentations, including the bays of Pomerania, Lübeck, and Kiel, and the Gulf of Danzig. The principal islands are Rügen, Bornholm, Oland, Gottland, Osel, Dagö, and the Åland and Danish groups. The depression occupied by the Baltic is generally shallow; on the Stolpe Bank, off Stolpmünde in Germany, the depth is less than 40 feet, and over considerable areas it does not exceed 120 feet. Like the North Sea, the greatest depths are found in the northern part, the extreme being 1542 feet (south of Stockholm). The Baltic receives the drainage of a large part of northern Europe, including western Russia, northeastern Germany, and nearly the whole of Sweden. Owing to this drainage and to the restricted channel to the North Sea, the water of the Baltic contains only a third as great a percentage of salt as the Atlantic, and the saltness shows a tendency to decrease toward the west and north. Tidal action is apparent only on the southern coasts, but there are surface currents flowing quite constantly from the Baltic to the North Sea and deeper currents flowing in the opposite direction. Storms are frequent, and often cause severe losses to shipping. Easterly winds are particularly dangerous, as they drive the water before them in the form of huge tidal waves. Navigation in the northern part is suspended by ice during the winter season and early spring. The Baltic is of great commercial importance to northern Europe; the most important ports are Copenhagen, in Denmark; Kiel, Lübeck, Stettin, Danzig, and Königsberg, in Germany; Riga, Reval, Saint Petersburg, Cronstadt, Helsingfors, and Åbo, in Russia; and Stockholm, Karlskrona and Malmö, in Sweden. The Baltic is connected with the North Sea by an artificial water-way, the Kaiser Wilhelm Canal, 61.3 miles in length, which was completed in 1895. The canal contains no locks, and is of sufficient depth to permit the passage of deep-sea ships.

BALTIMORE. The metropolis of Maryland, and the sixth city in point of population in the United States, is situated on the Patapsco River, at the head of tide water and navigation, about 14 miles from Chesapeake Bay. The city extends about 6¼ miles from east to west, and between 4½ and 5½ miles from north to south, covering an area of 31½ square miles, or 20,160 acres.

Physical Characteristics. Baltimore is situated, in common with other great centres of the Atlantic border, at the junction of the plateau of old crystalline rocks and the overlying beds of younger and still unconsolidated formations, which stretch out toward the east. The hills within the city are composed of younger sands and gravels, which are cut through by such streams as Herring's Run, Jones's and Gwynns' Falls, and the Patapsco River. The climate of the city is temperate and bracing, removed alike from the bitter cold and enervating heat of more extreme localities.

Baltimore is roughly divided into two nearly equal parts by a small stream—Jones' Falls—which rises 20 miles to the north and flows entirely through the city. It is confined by granite walls, and is crossed by well-constructed bridges. The portion of the city northeast of the stream, of which Fells's Point and Canton, with wharves, factories, and canneries lining the water's edge, are respectively the south and southeast ends, is still denominated 'Old Town.' The southeastern section is occupied largely by immigrants, and presents the ordinary characteristics of a seaboard city. To the north, east, and northeast stretches the residential quarter of the city's bread-winners. Of the section west of the Falls, Locust Point is an irregular strip extending to the southeast, with numerous wharves, railroad terminals, and grain elevators, and tipped at the very extremity by Fort McHenry. The southwestern corner is Spring Garden. The wholesale business section extends north from Pratt Street, the extreme northern limit of the harbor, and is bounded by Paca, Baltimore, and Light streets. A little beyond is Baltimore Street, the chief latitudinal thoroughfare. Further on, widening out to the west, lies the retail shopping district, while beyond, extending half way to the northern limits, is the fashionable residential quarter. The northern and northwestern sections are substantial dwelling districts, fringing out to modest but comfortable artisans' homes. Houses are numbered in the decimal plan, running north and south from Baltimore Street, and east and west from Charles Street.

Monuments and Buildings. Baltimore is called the Monumental City, a title derived less from the number of its stone memorials than from the early date at which Washington Monument, in Mount Vernon Place—a noble marble shaft rising 164 feet, surmounted by a heroic figure of Washington—and Battle Monument, in Monument Square, were erected. Mount Vernon Place contains several bronzes by Barye and one by Dubois, the Rhinehart monument of Chief-Justice Taney, and the Storey replica of the George Peabody Monument. Other monuments of interest are the Wells and McComas, the Armistead, the William Wallace, the Wildey, and the Ridgely monuments.

The characteristic of Baltimore architecture is solidity and convenience. The public buildings of interest in this connection are the city hall, the post office, the city jail, the Peabody Institute, the Johns Hopkins Hospital, the Enoch Pratt Free Library, the Masonic Temple, and, most beautiful of all, the courthouse, of white marble, in classic Renaissance style, with interesting mural paintings by Blashfield and Turner, and a bust of Severn Teackle Wallis, the distinguished Maryland jurist and man of letters. The Continental, Equitable, and Fidelity buildings are office structures that compare favorably with those of New York and Chicago. The important clubs of the city are the Maryland, occupying a beautiful Romanesque edifice of white marble; Baltimore, Athenæum, University, Phœnix, and Country (Roland Park). The Stafford, Rennert, Carrollton, Eutaw, and Belvedere are the principal hotels. A United States Sub-Treasury is located here.

Parks and Squares. The public parks and squares of Baltimore are beautiful and well distributed. The more important are Druid Hill (671 acres), Clifton (255 acres), Patterson (106 acres), Riverside (17 acres), and Federal Hill (8 acres). Druid Hill may be reasonably described as one of the finest parks in the United States. It abounds in natural beauties which have been carefully preserved and emphasized. Druid Lake, an artificial basin, is part of the municipal waterworks system. Carroll Park contains the historic Carroll mansion. Clifton Park was purchased from the Johns Hopkins University. Wyman Park, and a tract which will probably be called University Park, situated adjacent to Homewood (the prospective suburban site of the Johns Hopkins University), on Charles Street, bid fair to rank among the most attractive parks of the city.

Suburbs. Baltimore's suburban growth has been very rapid of recent years. The suburbs extend north and northwest of the city proper for about 10 miles, and are made accessible to the heart of the city by electric car lines. Among the more important of them are Arlington, Mount Washington, Roland Park, Walbrook, and Catonsville.

CEMETERIES. Greenmount Cemetery, containing the graves of many illustrious men, including those of John McDonogh, Johns Hopkins, and Sidney Lanier; Loudon Park, and the National Cemetery, are the most important burial places. Westminster, one of the oldest and smallest church-yards in the city, contains the grave of Edgar Allan Poe.

EDUCATIONAL INSTITUTIONS. Baltimore ranks as one of the foremost educational influences of the country. A graded system of public schools provides free instruction in kindergarten, primary, secondary, collegiate, and normal studies, and in manual training. The system comprises 109 schools, employing 1750 teachers, and instructing annually 85,000 pupils. Baltimore is the seat of the Johns Hopkins University, opened for instruction in 1876, and distinguished for its graduate courses. The institution owes its foundation to the beneficence of a Baltimore merchant, who left a large fortune, in two nearly equal amounts, for the endowment of a university and a hospital. Other institutions of learning are Saint Mary's Seminary of Saint Sulpice, Loyola College, Woman's College of Baltimore, Morgan College (colored), and Saint Joseph's Seminary (colored). Among the professional schools are the law and medical departments of the University of Maryland, College of Physicians and Surgeons, Baltimore Medical College, Baltimore University, Woman's Medical College, Maryland College of Pharmacy, and Baltimore College of Dental Surgery. The last named, founded in 1839, is the oldest dental college in the world. Other schools and academies are McDonogh School, Bryn Mawr School, Calvert Institute, Academy of the Visitation, Notre Dame of Maryland, and Mount de Sales Academy.

The Peabody Institute, endowed by George Peabody, who laid the foundation of his great fortune in Baltimore and entertained a strong friendship for its people, contains a valuable library of 143,000 volumes, an interesting art gallery, and a well-organized conservatory of music. The art galleries of Mr. Henry Walters contain one of the choicest private collections in the United States, and are opened to the public at certain seasons for the benefit of a local charity. The Maryland Historical Society has a valuable collection of books, pamphlets, and manuscripts, and an art gallery. The Maryland Academy of Sciences possesses interesting natural history collections. The Maryland Institute includes a school of art and design and a library.

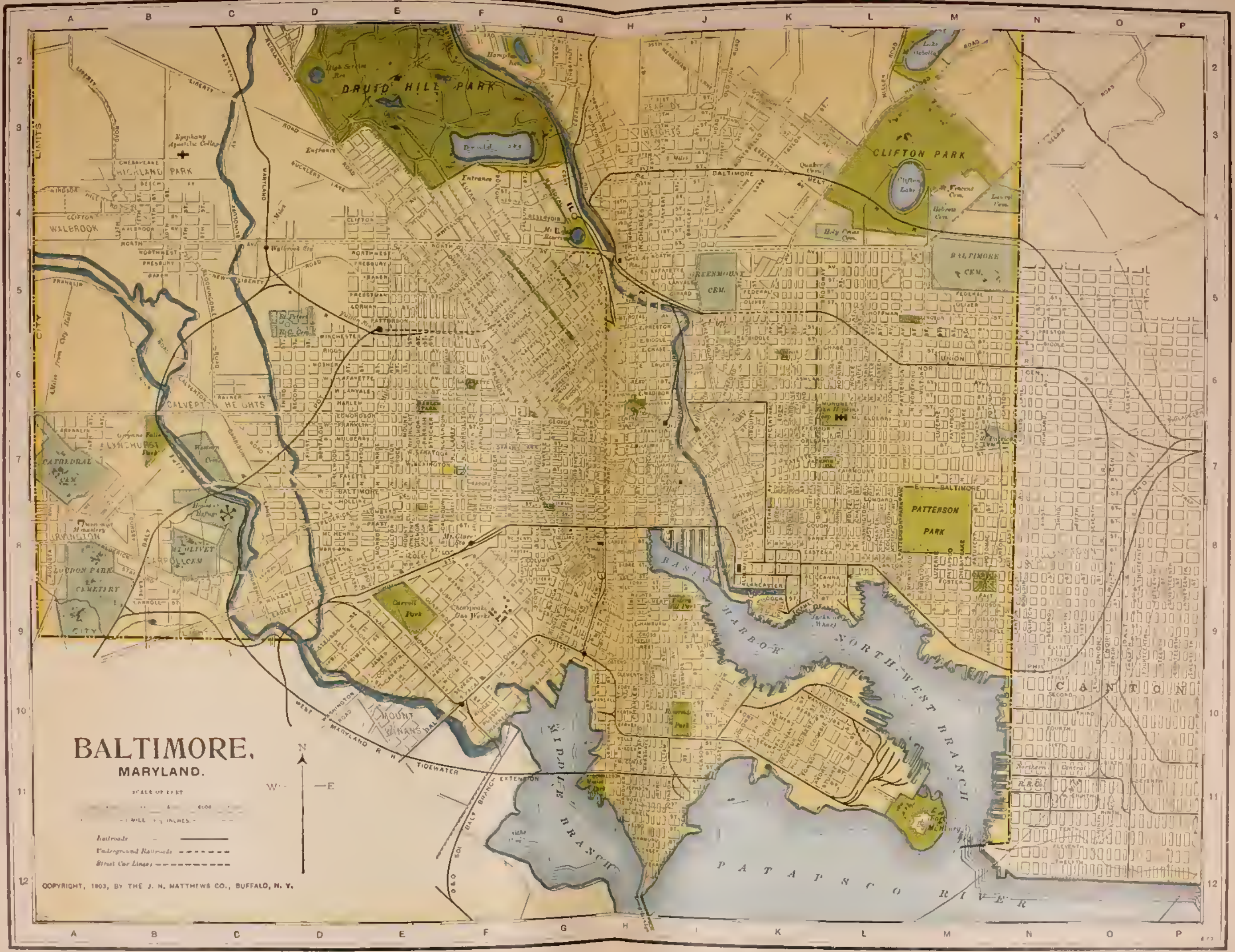
The libraries of the city, in addition to those connected with the several institutions enumerated above, are the Enoch Pratt Free Library, containing more than 200,000 volumes, with branch libraries in various parts of the city; the Baltimore Bar Library, the Maryland Diocesan Library, the Medical and Chirurgical Faculty Library, and the New Mercantile Library.

CHARITABLE INSTITUTIONS. Among the important charitable institutions of the city, supported by endowment, private contribution, or public aid, are the Johns Hopkins Hospital, in construction and equipment one of the finest in the world; Sheppard-Pratt Insane Asylum, Maryland University Hospital, Union Protestant Infirmary, City Hospital, Maryland General Hospital, Saint Joseph's Hospital, Church Home and Infirmary, Hebrew Hospital and Asylum, Baltimore Orphan Asylum, Thomas Wilson Sanitarium, Saint Vincent's Infant Asylum, Nursery and Child's Hospital, Hebrew Orphan Asylum, Bay View Asylum (the city alms house), House of Refuge, Maryland Hospital for Insane, Mount Hope Retreat. Numerous other sectarian and nonsectarian institutions provide for the relief of the sick, needy, and the infirm. A Pasteur Institute, established by the city, is in successful operation.

CHURCHES. The first Methodist Episcopal Church in the United States was founded in Baltimore. The city is also the seat of a Protestant Episcopal bishop and of a Roman Catholic archbishop (Cardinal Gibbons), whose diocese is the first in the United States. Important Roman Catholic Church assemblages have been held here from time to time, one of the most interesting being the Third Plenary Council in 1885.

The city abounds in noteworthy ecclesiastical structures. The Roman Catholic Cathedral, built in the early part of the Nineteenth Century, is remarkable for the chaste simplicity of its design and proportion of its parts. Of more recent construction are Grace Episcopal Church, First Methodist Episcopal Church, First Independent Christ's Church, First Presbyterian Church, First Baptist Church, Associate Reformed Church, Vernon Place Methodist Episcopal Church, and the Eutaw Place, Madison Avenue, and Bolton Street synagogues.

TRADE AND INDUSTRY. Natural geographical situation, favorable trade connections, and unusual harbor facilities constitute Baltimore's chief commercial advantages. At the entrance to the harbor, the Patapsco River divides into the northwest, southwest, and middle branches. The northwest pierces 2½ miles into the very heart of the business portion of the city. The southwest and middle branches envelop the southern and southwestern sections, giving a long expanse of water front in close proximity to the lines of the Baltimore and Ohio Railroad. The main harbor, or that on the northwestern branch, has a water front, measured on the pier head line, of 6½ miles, an area of 630 acres, and while leaving ample fairways for the movement of vessels, furnishes 96 acres of anchorage grounds, on which the least depth of water is 19 feet. The whole of the lower portion of the harbor, covering the elevators and steamship piers, has a depth of 27 feet at mean low water. The harbor along the southwest and middle branches has, within the city limits, and measured on the pier head line, a water front of 5½ miles, and nearly as much more on the opposite banks in the county. It covers an area of 1300 acres, and has channels of 17 feet depth at mean low water. This favorable geographical situation has been emphasized and developed by the establishment of direct lines of communication. The Baltimore and Ohio Railroad reaches in one direction to Philadelphia, thence by direct connection to New York, and on the other hand penetrates to the west, southwest, and northwest to the waters of the Mississippi. The Northern Central Railroad serves to connect Baltimore with the great Pennsylvania system, and affords a direct outlet to the north. Two associated branches of the Pennsylvania system are the Baltimore and Potomac to Washington, and the Philadelphia,



BALTIMORE,

MARYLAND.

SCALE OF FEET

1 MILE = 1½ INCHES

Railroads

Underground Railroads

Street Car Lines

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Wilmington and Baltimore to Philadelphia and the north and east. The Western Maryland Railroad, constructed largely through municipal aid, and extending in one direction through the fertile valley of the Shenandoah, and in another into the rich Cumberland Valley, has recently been acquired by the extensive Wabash system and made possible another great trunk line connection.

Regular communication between Baltimore and foreign ports is afforded by the North German Lloyd to Bremen, the Neptune Line to Rotterdam, the Atlantic Transport Line to London, and a number of other lines offering frequent service. The city is the largest corn exporting port in the United States. Other important articles of local export are wheat, flour, cotton, tobacco, copper, and coal. Importing activity centres about iron ore, bananas, pineapples, cocoanuts, sugar, and general merchandise.

The manufacturing enterprises of Baltimore are most varied, scarcely a single important industry being unrepresented. It is the largest manufacturing centre in the United States for ready-made clothing, shirts, fertilizers, straw goods, cotton duck, fruit canning, and oyster packing, while in other important fields its operations are of absolutely greater magnitude. The shipbuilding industry of Baltimore has recently undergone marked development. Sparrow's Point, with its great steel plant, Curtiss Bay, Locust Point, and Woodberry are busy industrial centres.

The closer proximity of Baltimore, by several hundred miles, to the great cotton belt of the South, to the grain-growing sections of the West, and to the wood, coal, and iron wealth of the interior, affords cheap and easy access to the raw materials of industry. The proximity of a rich and productive country, the low cost of water transportation, and the economy of domestic distribution through municipal markets, render the cost of living in Baltimore much less than in many cities of smaller size. The largest of these markets, Lexington, when in full activity, is one of the characteristic sights of the city.

Municipal Government. The original municipal charter, granted in 1796 and repeatedly amended and modified, was replaced in 1898 by a modern reform instrument of government. Under its provisions the government of the city is vested in a Mayor, who holds office for four years, a bicameral city council, and various administrative departments, boards, and commissions. The municipal officials, with the exception of the city register and printer (elected by the city council), and the comptroller, surveyor, and president of the second branch of the city council (elected by popular vote), are appointed by the Mayor, with the consent of the higher branch of the city council. The Mayor, comptroller, city register, and president of the higher branch of the city council constitute a board of estimates, exercising essential control of municipal finances. The board of awards is of similar composition, with the register substituted for the city engineer. The Mayor, comptroller, register, and two other persons appointed by the Mayor serve as commissioners of finance in the administration of the municipal debt.

Baltimore spends annually, in maintenance and operation, about $9,500,000, the principal items of expense being: police department, $1,000,000; charity and corrections, $337,049; street lighting, $325,000; fire department, $550,000; parks and squares, $388,911; schools, $1,500,000; interest on debt, $1,000,000. The waterworks, representing a total construction expenditure of nearly $15,000,000, are owned and operated by the city. The entire system now includes some 634 miles of mains and nine reservoirs. The city has a gross bonded debt of about $40,000,000, and the assessed valuation of property, real, personal, and corporate, is $440,000,000. The city parks are maintained by a franchise tax upon the receipts of the street railways.

Population. The twelfth census (1900) of the United States gives the total population of Baltimore as 508,957, divided into 105,584 families, occupying 89,442 dwellings. Of this number 243,280 are males and 265,677 are females; 440,357 are native born and 68,600 are foreign born. The total number of whites is 429,218, and of colored 79.739. Of the whites 361.278 are native born, 67,940 are foreign; 236,053 of the native whites have native parents and 125,225 have foreign parents. The total illiterate population ten years old and over is 29,148, of whom 12,111 are white and 17,037 are colored.

History. The foundation of Baltimore is associated with the emergence of the proprietary Government of Maryland from an era of troublous times toward the close of the first quarter of the Eighteenth Century. With the expansion of commerce and the increase of population, it was not long before the need of a port near the head of Chesapeake Bay began to be felt. Attention was directed to a remarkable site on the north side of the Patapsco River, 14 miles from the waters of the bay, offering easy access and safe harbor to vessels of large size. On July 14, 1729, a petition was presented to the Provincial Assembly praying for the erection of a town at this point, and three weeks later a bill to this effect was passed.

The early life of the settlement was a race for supremacy in trade with older towns of the province, in which Baltimore slowly but surely forged ahead. The history of the city immediately before and during the Revolutionary War forms a familiar chapter in our national history. From Baltimore largely came the zeal and energy with which Maryland entered into the War of Independence, and which has made the valor of the Maryland Line immortal. The events of the war interrupted foreign commerce and cut off all continental supplies; but it stimulated local manufactures and shipping thereafter. Local merchants engaged extensively in the world's carrying trade, and 'Baltimore clippers' became famous. During the War of 1812 the city was attacked by land and water, but successfully defended in each case. During the bombardment of Fort McHenry, Francis Scott Key, while detained on board a British vessel, composed the national anthem, "The Star Spangled Banner." The introduction of new industrial methods succeeded the reactionary depression following the War of 1812. The Chesapeake and Ohio Canal and the Baltimore and Ohio Railroad were projected and carried forward by local enterprise. The first telegraph line in the United States was constructed between Washington and Baltimore. Industry, trade, and commerce suffered heavily from the events of the Civil War. Communication with the South was completely cut off, and Western trade diverted to other channels. A mob attack upon a Massachusetts regiment in its passage through the city, on April 19, 1861, inflamed the country and led to the Federal occupation of the city. But the causes of prosperity were suspended, not destroyed, and as the prostrate industrial life of the territory naturally tributary to Baltimore revived, the city emerged into new importance as an industrial centre. The residential section of the city expanded, and in 1888 a large area or 'belt' of suburban territory was annexed to the corporate limits. The diversification of manufactures, the growth of commerce, the extension of trade, the increase of population, the influx of foreign elements, the rise of economic standards, the development of civic consciousness have been the essential elements in the later municipal history of Baltimore.

Consult: Scharf, *The Chronicles of Baltimore* (Baltimore, 1874); Thomas, *The City Government of Baltimore* (Baltimore, 1889); Hollander, *Guide to the City of Baltimore* (Baltimore, 1893); Love, *Baltimore: The Old Town and the Modern City* (Baltimore, 1895); and Hollander, *The Financial History of Baltimore* (Baltimore, (1899).

BALTIMORE, Barons of, or Lords Baltimore. The title of the Calvert family in the Irish peerage. Sir George Calvert, first Lord (c.1580-1632). A British statesman. He was born at Kipling, Yorkshire, and graduated at Oxford in 1597. He then became secretary to Sir Robert Cecil and won the esteem of James I., who knighted him in 1617 and made him Secretary of State in 1619. He became a Catholic in 1624 and resigned his office, but continued in favor with the King, and in 1625 was raised to the Irish peerage as Baron of Baltimore. He early became interested in the colonization of the New World and in 1621 dispatched a ship to Newfoundland to establish a settlement. In 1623 he obtained a charter to found a colony there under the name of the Province of Avalon (q.v.). He crossed the ocean himself in 1627, and again in 1629, taking his family with him, but encountered many difficulties from the hostility of the French and the severity of the climate, and soon applied for a grant of land in a more genial region. Although the King had tried to dissuade him from his project, he finally obtained (in 1632) a grant of the territory which was called 'Maryland' by Charles I. in honor of the Queen. Before the charter was issued, Sir George died, and the grant devolved upon his son Cecil, who thus became the real founder of Maryland, although he never visited the colony. He sent settlers, however, under his younger brother, Leonard (see Calvert, Leonard), who was the first Governor of Maryland (1634-47). The successive Barons of Baltimore, or Lords Baltimore, were: George (first), Cecil (second), Charles (third), Benedict (fourth), Charles (fifth), and Frederick (sixth). The house became extinct with the last, who died without leaving legitimate issue. All of them, including Leonard, were prominently identified with the history of Maryland.

Consult: Browne, *George Calvert and Cecilius Calvert, Barons of Baltimore* (New York, 1890); Wilhelm, *Life of George Calvert*, one of the Maryland Historical Society's monographs; and Kennedy, *Discourse on the Life and Character of George Calvert, Lord Baltimore* (Baltimore, 1845).

BALTIMORE BIRD. See Oriole.

BALTIS, bäl'tēz. See Baltistan.

BALTISTAN, bäl'tē-stän' (Pers. *stan*, district, region; of the Baltis), or Little Tibet. A province of Kashmir, a feudatory State of British India, situated in the Mustagh Chain on the Upper Indus (Map: India, C I). Its area is about 13,000 square miles, and it is exceedingly mountainous, containing within its bounds some of the highest peaks of the Mustagh Chain. The capital, Iskardo, is situated at an elevation of nearly 8000 feet, and can be approached only by a pass over 18,000 feet above the sea. Baltistan was originally an independent principality, until conquered in 1835 and finally incorporated with Kashmir. The inhabitants of Baltistan, estimated at about 60,000, are of Mongolian origin and profess Mohammedanism. They speak a Tibetan dialect, and are otherwise akin to the peoples of that stock. They are doubtless a somewhat mixed race physically, an Aryan (Hindu) element having been added to the original Mongolian, with some strain of Dravidian blood. The Baltis are an interesting mountain people. Of recent literature may be mentioned Bellew, *Kashmir and Kashgar* (London, 1875); Biddulph, *Tribes of the Hindu-Kush* (London, 1881).

BALTZER, bälts'ẽr, Johann Baptista (1803-71). A German theologian. He was born at Andernach; studied at Bonn, and after his ordination to the priesthood in 1829, was made professor of theology at Breslau in the following year. He was at first an enthusiastic follower of Georg Hermes in his attempt to reconcile the newer German philosophy with the Roman Catholic teaching, but definitely broke with his school in 1839, and associated himself with the speculations of Anton Günther. After the Papal condemnation of the latter's teachings, Baltzer submitted indeed, but his independent spirit led him into further difficulties, and he was suspended in 1862. As in natural sequence he was a strenuous opponent of the definition of Papal infallibility, and was a promoter of the Old-Catholic movement in Silesia. For his life, consult: Friedberg (Leipzig, 1873), and Melzer (Bonn, 1877), both favoring Baltzer's attitude, and Franz (Berlin, 1873), representing the other side.

BALTZER, Wilhelm Eduard (1814-87). A German theologian and leader of the movement known as the *Freie Gemeinden*, or free religious communities which have sprung up since the middle of the Nineteenth Century in opposition to dogmatic and traditional theology. He was born at Hohenleine, studied at Leipzig and Halle, and entered the Lutheran ministry, but on account of the liberal views which, following Delitzsch, he had adopted, was not looked upon with favor. Consequently, in 1847, he founded a 'free church' of his own, and presided over a convention of similar organizations at Nordhausen in the same year. Until 1881 he continued to be a representative leader among them, but lived in retirement at Grotzingen for the last few years of his life, partly occupied in the promotion of vegetarianism, for which he founded an association and an annual publication. His writings were mainly devoted to the propagation of his views: among them are *Alte und neue Weltanschauung* (1850-59), and *Gott, Welt und Mensch* (1869).

BALU, bä′lōō (native name). A variegated wild-cat of Sumatra, probably a variety of *Felis aurata*.

BA-LUBA, bȧ-lōō′bȧ. A Negroid people of the middle Kassai Basin, Congo Free State. They are intelligent, adaptive, industrious, and skilled in the arts; travelers praise the good qualities of this powerful people.

BALUCHI, bȧ-lōō′chē, or **BELOOCHE.** A modern Iranian dialect, with many foreign loan-words from the Persian, Arabic, Turkish, and Sindhi. The Baluchi is divided into two main dialects, one of which, the southern or Maprani, has preserved many of the older features of the language with less change than is the case with the northern Baluchi, which, however, possesses the better-known literature. The Baluchi is far inferior to the Afghan (q.v.) in literary development. On the other hand, it represents in its consonantal system by far the oldest stage of any of the modern Iranian dialects, being in this regard on the same level as the Middle Persian or Pahlavi (q.v.). Consult: Geiger, "Sprache der Balutschen," in Geiger and Kuhn, *Grundriss der iranischen Philologie* (Strassburg, 1898), and the literature there cited.

BALUCHISTAN, bȧ-lōō′chē-stän′, or **BELUCHISTAN,** be-lōō′- (Pers. *stan*, district, region, of the Baluchis). A semi-independent country in Asia, bounded by Afghanistan on the north, Sindh (British India), on the east, the Arabian Sea on the south, and Persia on the west (Map: Asia, Central, K 6). It extends from latitude 25° to 32° N., and from longitude 61° to about 70° 30′ E., and covers an estimated area of 134,000 square miles, including the territory directly or indirectly held by Great Britain.

Description. The general appearance of the surface is rugged and uninviting. The chief mountain ranges enter from Afghanistan, through the northeastern end, and run in a generally southwestern direction toward the Persian frontier. Along the eastern frontier runs the Kirthar Range, terminating at Cape Monzen, on the Arabian Sea, and to the west of this are the Hala Mountains, while the northeastern portion of the country is traversed in a north and south direction by a continuation of the Suleiman Mountains. The level country is found mainly in the northwest. The highest peaks have an altitude ranging from 10,000 to 12,000 feet. The coast line, having a total length of about 600 miles, is mostly elevated and very little indented. It is without any harbors, but has a few roadsteads, the most important of which are Ormarah and Gwadur. The rivers of Baluchistan are generally short, and flow in a direction from north to south. Very few of them, however, reach the coast, as their scanty waters are either diverted for irrigation purposes or are absorbed by the sandy soil. The chief of them are the Bolan and the Mula in the north, the Purali and the Hingol in the south, the latter entering the sea, and the Dasht at the southwestern end, also discharging into the Arabian Sea. The climate varies greatly with the formation of the surface. The winters are generally severe, and snow is found even in the valleys. The summers are excessively hot, especially on the coast.

Industries. Baluchistan has but a small proportion of cultivable land. Outside of the mountain regions, which are usually barren, a large part of the level country is desert. The larger part of the agricultural land is found in the Province of Gundava, where the common Indian grains grow freely. Cotton, indigo, and all kinds of southern fruit are cultivated in several parts of the country, and the date-palm grows in abundance in the southwestern Province of Mekran. Land available for grazing purposes is found in some localities, and camels, sheep, and horses are reared. The mineral deposits are numerous, and include gold, silver, copper, iron, zinc, saltpetre, and different kinds of salts. Manufacturing industries are practically non-existent; the principal products are rough blankets. The chief exports are wool, hides, dried fruit, madder, and tobacco. Inland transportation is effected chiefly by camels, while the trade with British India is carried on through the Sindh-Pishin Railway. A railway line through the eastern part of Baluchistan, from Karachi to Khelat, by way of Lus Bela, is projected.

Government. The larger part of Baluchistan is under the administration of native chiefs, subject to the Khan of Khelat, who is advised by a British political agent, representing the Governor-General of India. The districts of Quetta and Bolan, in the northeast, nominally belong to Baluchistan, but are administered by British officials; while the territory east of Quetta is now treated as a part of British India. The population of Baluchistan (1902) is estimated at 800,000, and consists principally of the two tribes of the Baluchis and the Brahuis, the latter being the dominant class.

Ethnography. The Baluchis, after whom Baluchistan is named, are, like the Afghans, an Aryan people, with Indic and Iranic linguistic affinities, perhaps more of the latter. They are physically above the average, largely nomadic, and present some of the best and some of the worst characteristics of partly civilized races. In physical constitution, dress, and mental disposition they are distinguished from the Brahuis, who seem to have come earlier into the country. Both peoples are followers of Islam, professing the Sunnite creed, and the various tribes still lead a semi-independent life. Less important peoples in Baluchistan are the Persian Dehwars, or 'villagers,' and the Gypsy-like Luris.

History. Baluchistan, which is first mentioned by the historians of Alexander the Great under the name of Gedrosia, was ruled from early times to the end of the Seventeenth Century by a line of Hindu princes. Hard pressed by the mountain tribes of the interior, the Hindu rulers summoned to their aid the Brahuis, under their leader Kumbar, who subdued the predatory tribes, and then made themselves masters of the country. The descendants of Kumbar established themselves firmly in power, and were confirmed in their authority by the celebrated Nadir Shah, ruler of Persia, who overran the region on his expedition into India in 1739. Under the energetic Nasir Khan (1739-95), the supremacy of the Khan of Khelat was successfully asserted over the numerous tribal chiefs. British influence in Baluchistan dates from 1839, when, in reprisal for the Khan's hostile conduct, Khelat was stormed by General Willshire. By a treaty of alliance concluded between Nasir Khan II. and Great Britain in 1854, that ruler, in return for an annual subsidy of 50,000 rupees, later increased to 100,000, conceded to the British the right of armed intervention in any part of his territory—an exercise of power which the British Government carried to the extent of forcing the resignation of the ruler of Khelat, Mir Mahmud Khan, in 1893. The present status in Baluchistan was created by treaties in the years 1876 and 1883. Consult: Macgregor, *Wanderings in Balochistan* (London, 1882); Möckler, "Origin of the Baloch," in *Asiatic Journal* (Calcutta, 1896); Noetling, "Ueber prähistorische Niederlassungen in Baluchistan," in *Zeitschrift für Anthropologie und Ethnologie* (Berlin, 1899); Bellew, *Races of Afghanistan* (London, 1880).

BALUCKI, bȧ-lōōts'kē, MICHÆL (1837-1901). A Polish author, born at Cracow. He was implicated in the Polish Revolution of 1863 and was imprisoned for a year. Upon his release he devoted himself to literature. His writings were characterized by a strongly democratic and decidedly satirical tendency. Among his novels, most of which ridicule the faults and prejudices of Polish society, are the following: *The Old and the Young* (1866); *Brilliant Misery: A Romance Without Love; Sabina: From Camp to Camp;* and *The Jewess.* He has also written a number of comedies, such as *The Chase for a Husband; The Town Council* (1880), very popular; *Miss Valerie* (1891); and *The Burgomaster of Pipidowka* (1894).

BALUGA, bȧ-lōō'gȧ. A mixed Malay and Negrito people living in Central Luzon. See PHILIPPINES.

BAL'USTER, popularly **BAN'ISTER** or **BAL'LASTER** (Fr. *balustre*, It. *balaustro*, through Lat. *balaustium*, from Gk. *βαλαύστιον*, *balaustion*, flower of wild pomegranate-tree: so named from its shape). The name given to the small shafts or pillars set in a line at short equal distances, and supporting a cornice or coping. These miniature pillars have generally either a pear-shaped swelling at the lower end, or consist of two pear-shaped pieces, placed above each other, a ring of moldings being set between them.

BAL'USTRADE (from *baluster*). A range of balusters, together with the cornice or coping which they support. The balustrade is often used as a parapet for bridges, the roofs of large edifices, etc., or as a mere termination to a structure. It is also used to inclose stairs, altars, balconies, etc. Balustrades are of stone, metal, or wood. The richer types have ornamentation of varied designs in perforated slabs, reliefs, or free members between the balusters.

BALUZE, bȧ'lụz', ETIENNE (1630-1718). A French historian, born at Tulle. Almost his entire life was spent in Paris, and there he published his famous histories—*Histoire généalogique de la Maison d'Auvergne* (1708, 2 vols.), and *Vitæ Paparum Avenionensium* (1693, 2 vols.). The latter is on the *Index* because of its Gallicanism, and the former led to his temporary banishment because too favorable to Cardinal de Bouillon. He edited the works of Charlemagne and Servatus Lupus.

BALZAC, bȧl'zȧk', HONORÉ DE (1799-1850). The greatest novelist of France, and, according to some critics, of the world, if we regard at once the quantity of his work, the multitude and variety of his creations of character, his coördination of them into a microcosmic picture of the society of his time, and the scope and depth of his insight into the sordid ambitions and ideal impulses that actuate human life. His own career had given him a varied and acute experience. He was born at Tours, May 16, 1799, the first of four children of well-to-do *bourgeois*, self-indulgent, a little Rabelaisian, and not at all literary. His infancy was passed with a foster-mother in the country. He showed no cleverness in his studies, and found no appreciation at home, but he was a diligent pupil of the 'truant school.' His wanderings along the vineyards of the Loire and in the noisy cooper-shops of the suburbs of Tours have left picturesque traces throughout his work, especially in the *Contes Drôlatiques*, and he has borne an eloquent witness to the pathos of his school life in *Louis Lambert*.

Balzac had very early what his sympathetic sister Laura calls 'the intuition of renown.' A family misfortune was to him a kind providence, for it brought him at nineteen to Paris and stimulated his literary activity by contact with Guizot, Villemain, and Cousin. His novels, especially *César Birotteau*, attest his three years' study of law; but he refused to practice, and in spite of discouragements, domestic and public, he devoted himself to literature, doubting sometimes his power, but never his vocation. It took him ten years (1819-29) to learn his trade, the management of his novelistic tools. His work in this period ranks with that of Pigault-Lebrun. Only in the light of the future can it be said to show even promise of the kind of excellence which he was to realize. Harassed by poverty, oppressed by debts due to caprice and bad judgment, he worked indefatigably, and at last produced in *Les Chouans* (1829) a story of Brittany in 1799, one of the first and best of the historical novels of France, though its attempted imitation of Scott is more obvious than successful. What follows *Les Chouans*, good and bad, was admitted by Balzac to a place in his works; what went before, he ignored. The next six years were years of marvelous fertility, sustained excellence, and progressing power, fostered by intercourse with Hugo, Vigny, Lamartine, and George Sand. He made useful aristocratic acquaintances also, the Duchesse d'Abrantès and Madame de Castries, his Duchesse de Langeais. Then he fell under the spell of a Polish lady, Madame Hanska, whom he had met some years before, and till the death of M. Hanska, in 1842, his production and development suffer some check, to revive again for the complete flowering of his genius for five years (1842-47). After that he became more and more absorbed in plans for marriage with Madame Hanska, and hindered from work by illness and by visits to the Russian estates of his betrothed, whom he married there a few months before his death. Balzac's correspondence with his sister and his recently published letters to Madame Hanska are a sufficient revelation of his character. To an intense imagination that made him at times a visionary, he joined an intense application that made him at times a recluse. In thought, the child was a man; in action the man was a child, capricious and prodigal, full of schemes that made others rich and kept him poor; restless, passionate, morbid sometimes, especially in the hope deferred of his unfortunate relation to Madame Hanska, but never forfeiting sympathy, because always frank and almost childlike in his broad humanity. There was something awesome in the intensity with which he lived out his fifty years. Hugo expressed this when he said at his grave in Père Lachaise that "such coffins proclaim immortality. We feel the divine destiny of that intellect which has traversed earth to suffer and be purified. So great a genius in his life cannot but be a great spirit hereafter."

In any survey of Balzac's work it is well to consider first what he tried to do. He explains this in the preface to his novels collected under the title *La Comédie Humaine*. He says his thought was to do for human nature what had recently been done for zoölogy—to show that all society was bound together by a unity of composition, diversified by evolution in varied environments, so that there were species of men as of animals. The soldier, the lawyer, the workman, the scholar, the statesman, would show as distinct and abiding characteristics as the wolf, the shark, the ass, the raven, and the sheep. But this, he continues, would require several thousand characters; and how should he give unity to his creations? He would let society tell its own story. He would be its secretary, draw up an inventory of its virtues and vices, gather the facts of its passions, compose types for it by uniting homogeneous natures, and so produce a history of manners from the point of view of a conservative, a Christian, and a monarchist, who knew through friends the Old Régime and the Republic, and had lived under the Empire, the Bourbons, and the democratic monarchy of July. His novels were to be as a secretary's minutes, ideal in conception, but real in detail, shrinking from neither vice nor passion, because these are the motive forces that melt and recast human nature, but giving to religion its due place, and making virtue not only lovable but interesting. That is what he undertook to do, and though his work is incomplete, he left no part unessayed. He has a right to ask that his work be judged as a whole, by the good as well as by the evil. Like that other *Comedy* of Dante, his *Human Comedy* has its Hell, but it has also its Purgatory and its Paradise. Balzac is by some considered immoral; others pronounce his work as a whole serious in purpose, high and edifying in tone.

The *Comédie Humaine*, as it stands, vast yet unfinished, has been compared by Zola to a cyclopean palace, with splendid halls and wretched corners, with broad corridors and narrow passages, and superpiled stories in varied architecture. Two thousand characters cross its stage; and in their mimic life, which to Balzac for the time became reality, they formulate the chief types and events of social existence in such a variety of setting that his comedy has not only its genealogy but its geography. It is a work of criticism, analysis, and investigation, to be enjoyed in its parts, but to be understood only as a whole. Balzac divided his *Human Comedy* into *Scenes of Private Life*, of *Provincial Life*, of *Parisian Life*, of *Country Life*, of *Politics and War*, and to these he added *Studies*, philosophical and analytic. There are those who admire the analytic acumen displayed in this division; but as Balzac frequently transferred tales and novels from one to another group to suit his fancy or a publisher's convenience, it seems time wasted to stress the classification. It is more philosophical to study his work as it grew in his mind—that is, chronologically—and then to treat it briefly in its entirety. *Les Chouans* was followed by six *Scènes de la Vie Privée* (1830), of which *El Verdugo* is a masterly tale of terror, and *Gobseck* one of the world's great studies of morbid avarice. *La Maison du Chat-qui-pélote* (1830), written before these, though published a little later, in its plea for conventional marriage shows Balzac to be a master in social psychology. And, as though he would excel at once in every genre, the same year witnesses the Dresden-shepherdess introduction and the luridly romantic close of *Une Double Famille;* the curious Macchiavellianism of *Les Deux Rêves; Adieu*, a masterpiece of tragic pathos; the fantastic *L'Elixir de Longue Vie;* two stories of abnormal love, *Sarrasine* and *Une Passion dans le Désert;* and, finally, an acute study of the purification of religious feeling through persecution in *Une Episode sous la Terreur*. And with all this came contributions to journals whose titles for this year alone fill two octavo pages of Louvenjoul's *Histoire des Œuvres de Honoré de Balzac*.

A marvelous fertility characterized the next three years, till his first meeting with Madame Hanska (1833). Much of this time he passed away from Paris, to avoid interruptions. The more important works of 1831 are *La Femme de Trente Ans* (incomplete), *L'Enfant Maudit* (incomplete), *Le Réquisitionnaire, Les Exilés* (a wonderful evocation of Paris in 1308, setting ajar the gate that was to open on the spirit world in *Louis Lambert* and *Séraphita*)*; Le Chef d'Œuvre inconnu;* the remarkable *L'Auberge Rouge;* the curiously mystic *Peau de Chagrin;* the mediæval legend, *Jésus-Christ en Flandre;* a remarkable study of avarice, *Maître Cornélius;* and, outside the frame of the *Human Comedy*, the *Contes Drôlatiques*. The work of 1832 is even more remarkable. It touches the depths of horror in *La Grande Bretêche*, rises to philosophic heights in *Louis Lambert*, deals gracefully with romantic honor in *Madame Firmiani*, and with romantic love in *La Bourse;* becomes pitiful in *Colonel Chabert*, and tragic in *Le Message;* gives an exquisite picture of child-life in *La Grenadière*, preaches a stern social morality in *La Femme Abandonnée*, epitomizes the French clergy of the Restoration in *Le Curé de Tours*, unveils the courtesan morals of the Renaissance in *Les Marana*, and crowns the year with the mystic *Louis Lambert*. And during 1833 also, he tells a correspondent that he lives in "an atmosphere of thoughts, ideas, plans, works, conceptions, that mingle, bubble, and sparkle in my brain." Of these, the *Contes Drôlatiques* show the effervescing of a joyous animal nature; *Férragus* is a sort of detective story; *Le Médecin-de-campagne* is photographic in its reproduction of peasant thought and country scenes, and *Eugénie Grandet* is Balzac's greatest study of avarice, and perhaps his greatest novel. No wonder that in January, 1834, Balzac complains that he is "dazed with ideas and hungry for rest." Yet this year produced *Père Goriot,* thought by many to be his best novel; *La Duchesse de Langeais, Le recherche de l'absolu,* part of *Séraphita,* and many revisions of older work. Balzac now begins to suffer, naturally, from neuralgia, but in 1835 writes a fine study of remorse, *Une drame au bord de la mer;* an inferior one, *Melmoth Réconcilié;* the weirdly sensuous *La fille aux Yeux d'Or;* and that subtly humorous 'bride's breviary,' *Le Contrat de Mariage.* His one long novel of the year, *Séraphita,* is an exquisitely mystic poem in prose, a hymn to the purification of human passion by a sublime aspiration for the divorce of sentiment from sense, first and best product of that love of his for Madame Hanska, which almost immediately became a distraction and a hindrance to his genius.

With 1836 we enter on a period of arrested development, although that year offers the charming *Messe d'Athée;* the ultra romantic *Lys dans la Vallée;* the admirable last part of *L'Enfant Maudit;* a classic study of *La Vieille Fille,* the French *School for Scandal; L'Interdiction,* a legal romance, and some less significant work. *Les Employés* marks in 1837 the lowest ebb of the mature Balzac. *Gambara, César Birotteau,* and the *Contes Drôlatiques* complete the work of that year; and 1838 is as relatively insignificant, with *Le Cabinet des Antiques, La Maison Nucingen, Une Fille d'Eve,* and the first part of what was to become a great novel. *Les Splendeurs et Misères des Courtisanes.* In this year he bought a country house, 'Les Jardies,' where Gambetta met his death, and where Balzac did most of his work until, in 1843, he bought and fitted up, in long-deferred hope of marriage, the city house in which he died. His country life lent a passing freshness to *Le Curé de Village* (1839) and to the early parts of *Béatrix,* a curious study of the instinct of social conformity common to all phases of feminine affection—the platonic, the cerebral, and the venal. To 1839 belongs also *Massimilla Doni,* and 1840 brought *Le Secret de la Princesse de Cadignan,* the fine *Seconde étude de Femme, Pierrette, La Muse du Département,* part of *Les Illusions Perdues,* with some very inferior work. Then something of his old exuberance returns, and 1841 sees *Une Ténébreuse Affaire,* the terrible *Bachelor Housekeeping* (*La Rabouilleuse*), *Ursule Mirouet, Les Mémoires de deux jeunes Mariées, La Fausse Maîtresse,* and *Le Martyr Calviniste.* The year 1842 is unimportant in production, but memorable for the first collected publication of the *Human Comedy* under that title, with its evolutionist preface, and for additions and revisions to which this gave occasion. In 1843 Balzac spins copy in *Honorine,* finishes *La Muse du Département* and *Les Illusions Perdues,* a satire on French journalism, his longest novel, and by the number of its characters and the ramifications of its plot, one of the chief radiating points in the study of the psychology of *La Comédie Humaine.* He visited Madame Hanska, now a widow, this year in Russia, and in 1845 and 1846 twice in Italy and once in Germany; but he now worked, as he says, "with a fury more than French—Balzacian." In 1844 he printed the playfully romantic *Modeste Mignon,* completed *Béatrix* and *Les Petits Bourgeois* (printed, 1854), and published all that appeared during his lifetime of *Les Paysans,* the most sternly realistic of his novels. The years 1845 and 1846 produced only trivial work; but he was working on four great novels that were to crown his genius, *La Cousine Bette, Cousin Pons, Les Splendeurs et Misères des Courtisanes,* and *L'Envers de l'Histoire Contemporaine,* that was to close the *Human Comedy* with its noblest conception of Christian womanhood. Sickness made his last years unfruitful; and his posthumous *Député d'Arcis* is largely by his literary executor, Charles Ribou. Balzac's attempts in drama, except possibly *Mercadet* (first acted in 1851), are not significant.

Balzac died in Paris, August 18, 1850, at the height of his fame; but he was hardly appreciated at his true value until the epoch-making study of Taine (1865) showed him to be truly classic, one of the world's greatest creators in imaginative literature. The dominant trait in his style, imagination, and thought is exuberant virility. He has the animal and the intellectual intemperance of a romantic realist. He observes with minute accuracy, but it is with a poet's vision. He is of his world, yet he dominates it. No depths, no heights, of human nature seem foreign to him. His qualities become his defects. He is embarrassed at once by his wealth of ideas and of words. At his best his style is admirable, but it often staggers and occasionally falls under over-elaboration. In construction the stories lack proportion, but in character-drawing he stands next to Shakespeare. Here are the money-grubbers and the money-spenders, studied realistically and in symbolic types; cynics who mock the pleasures they pursue; parasites of social disease; fresh young girls; restless 'women of thirty'; poor relatives; philanthropists; saints —a social microcosm. Here is a novelist who tried to see life steadily and whole, to correlate all the material, moral, and social factors of modern society. With Shakespeare and Saint-Simon, says Taine, Balzac is "the greatest storehouse of documents that we have on human nature."

Balzac's works: 24 vols. fiction separately; *Human Comedy,* 47 vols.; *Droll Stories,* 3 vols.; *Drama,* 2 vols.; *Correspondence,* 2 vols.; *Letters to Madame Hanska,* 1 vol. The youthful *Works* are published in 10 vols.

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BALZAC, Jean Louis Guez de (1597-1654). A noted French essayist and stylist. He was born at Angoulême of wealthy parents, and having received a good education was taken by Cardinal de la Valette to Rome, and wrote thence letters to persons prominent at court that made him recognized on his return as master of composition and style in a generation that regarded such abilities excessively. His letters, collected in 1624, are empty, bombastic, and affected, but they entitle Balzac to rank as a reformer of prose, as his contemporary, Malherbe (q.v.), is of verse. He underwent bitter accusations of plagiarism in 1625, and withdrew to Angoulême, where he produced his uninspired and laborious lucubration, *Le Prince* (1631); *Discours* (1644); *Le Barbon* (1648); *Aristippe.* He was elected to the Academy in 1634. Balzac's *Works* were collected in 2 vols. (Paris, 1665, 1854). The *Letters* are well edited by Larroque (Paris, 1874).

BALZICO, bȧl-tsē′kō, Alfonso (1825—). An Italian sculptor, born at Cava di Tirreni, near Salerno. He was educated at the Academy of Naples and at Rome, where he completed the statues of Flavio Gioja and of John the Baptist, the latter a work of colossal dimensions. Upon his return to Naples he received an order from King Victor Emmanuel for the statues entitled "Cleopatra," "The Coquette," "Revenge," "The Free." Among the other works of Balzico are: "Massimo d'Azeglio" (1873, Turin), "Vincenzo Bellini," a fine marble statue of the composer, surrounded by female figures emblematic of his operas (Naples); "Duke Ferdinand of Genoa" (Turin); and "Victor Emmanuel" (1897, Naples).

BAMBA, bäm′bȧ. A Bantu tribe of the Ba-Fyot, or Ba-Kongo group, Angola. They are of medium stature, the figure well rounded and well proportioned, with woolly hair, dark brown color, beardless, and little hair on the body. They have adopted some of the arts of Europeans, though they easily revert under tribal influences. They play on a musical bow having a gourd resonator resting over the stomach. They are polygamists and ancestor worshipers, and practice witchcraft, although images of Roman Catholic saints are employed as fetiches. Small terra-cotta images are placed on the graves of important men.

BAMBARRA, bȧm-bär′rȧ. A former kingdom in Western Africa, situated on both sides of the Upper Niger, and now divided into the several States of Kaarta, Segu, Massina and Beledugu. It is mountainous in the southwest and flat and often swampy in its northern part. It has a soil of remarkable fertility, yielding annually two crops of corn, rice, yams, and many kinds of fruit. The climate is very hot, and the lower parts of the country are subject to inundation from time to time by the Niger. The principal industries are the weaving of cloth, a work performed exclusively by women, and the manufacture of metal and leather products. The commerce is quite extensive. The principal towns are Segu, Sansandig, and Bamaku. The inhabitants, a mixed negro and Fulah people, belong to the Mandigan family. Their food consists chiefly of maize, rice, cassava, and dates. In the arts, the Bambarra have been advanced because of their position as middlemen between the coast and the interior. The population is estimated at 2,000,000. Politically Bambarra belongs to the French sphere of influence. See Sudan.

BAMBERG, bäm′bĕrk. A city in the District of Upper Franconia, Bavaria, beautifully situated on the banks of the Regnitz, not far from its confluence with the Main, about 30 miles north of Nuremberg (Map: Germany, D 4). Numerous bridges connect the various sections of the city, which is intersected by three branches of the river. The streets are wide and well built, and there are a number of artistically laid out squares. The most noteworthy of its public buildings is the cathedral, a magnificent edifice in the Byzantine style, founded by Henry II., in 1004, and restored after a fire in 1110. It contains, among other monuments, the elaborately carved tomb of the founder and his consort, Cunigunda. Attached to the cathedral is a library of over 300,000 volumes, with valuable missals and manuscripts and what is represented to be the prayer-book of Henry II. There are several other fine ecclesiastical structures of early date and the old palace of the former prince-bishops of Bamberg. The ruins of the Castle of Altenburg, originally the seat of the Count of Babenberg, and the scene of many important historical events, stand on an eminence about a mile and a half from the town. The educational institutions of Bamberg are numerous, as are also the charitable institutions, which include a municipal hospital, an orphan and an insane asylum. The industries consist chiefly of the manufacture of beer—which is famous throughout Germany—cotton, woolens, gloves, musical instruments, leather, tobacco, sugar, starch, etc. The United States is represented by a consular agent. The city's government is in the hands of a municipal council of 42 members and an executive board of 19, elected by the former. Bamberg received municipal privileges in 973. Population, in 1890, 36,000; in 1901, 41,600. Consult Vöge, "Ueber die Bamberger Domsculpturen," in *Repertorium für Kunstwissenschaft*, Vol. XXII. (Berlin, 1899).

BAMBERGER, bäm′bĕrk-ĕr, Friedrich (1814-73). A German painter. He was born at Würzburg, and studied at the Berlin Academy and under Primavesi, at Cassel, and Rottmann, at Munich. In 1845 he made a tour through Normandy and England, as a result of which he produced the fine painting entitled "The Battlefield of Hastings," with its magnificent view of the sea. Among his best works, most of which are studies of Spanish landscapes, are the views of Gibraltar (at Munich), Algeciras, and Granada.

BAMBERGER, Ludwig (1823-99). A German parliamentarian and writer on political and economic subjects. He was born at Mainz, of Jewish parentage, and studied law at Giessen, Heidelberg, and Göttingen. Implicated in the Revolution of 1849 as editor of the *Mainzer Zeitung*, he was condemned to death, but was amnestied in 1866. As a member of the National Liberal Party in the Reichstag (1871-80) he defended the gold standard against the bimetallists, opposed the economic policy of Prince Bismarck (after 1879), and advocated free trade, becoming the founder and president of the Verein zur Förderung der Handelsfreiheit. Compelled by his antagonism to Prince Bismarck's theories to resign from the National Liberal Party, he formed the group known as the "Secessionists," which afterwards became merged in the German Liberal Party, and as a member of which he opposed the Colonial policy of the Government. The following are some of his important publications: *Erlebnisse aus der pfalzischen Erhebung* (1849); *Monsieur de Bismarck* (1868; English translation, 1869); *Die fünf Milliarden* (1873); *Deutschland und der Sozialismus* (1878); *Deutschthum und Judenthum* (1880); *Die Stichworte der Silberleute besprochen* (4th ed., 1893); *Erinnerungen* (published by Nathan, 1899).

BAMBINO, bäm-bē'nô (It., a baby). A term in art descriptive of the figure of the Infant Saviour. It is especially used of certain images of the swaddled Child, the most famous being the *Santissimo Bambino* in the Church of Ara Cœli at Rome, held in great veneration for its supposed miraculous power of curing the sick. It is carved in wood, painted, and richly decorated with jewels and precious stones. The festival of the Bambino, which occurs at the Epiphany, is attended by great numbers of country people, and the Bambino is said to draw more in the shape of fees than the most successful medical practitioner in Rome, for it is often carried in procession to the houses of the sick.

BAMBOCCIADES, băm'bŏch-ĭ-ädz' (Fr. *bambochade*, It. *bambocciata*, caricature, from *bamboccio*, puppet, little child). Grotesque painting. Peter Van Laer and Teniers were painters of such subjects, and the name is said to be derived from the nickname of Van Laer, *Bamboccio*, 'the cripple.' Rollicking and boisterous village games, with smoking, drinking, and festival-making in grotesque costumes are scenes characteristic of this style of painting. Wilkie in England has sometimes painted in this vein.

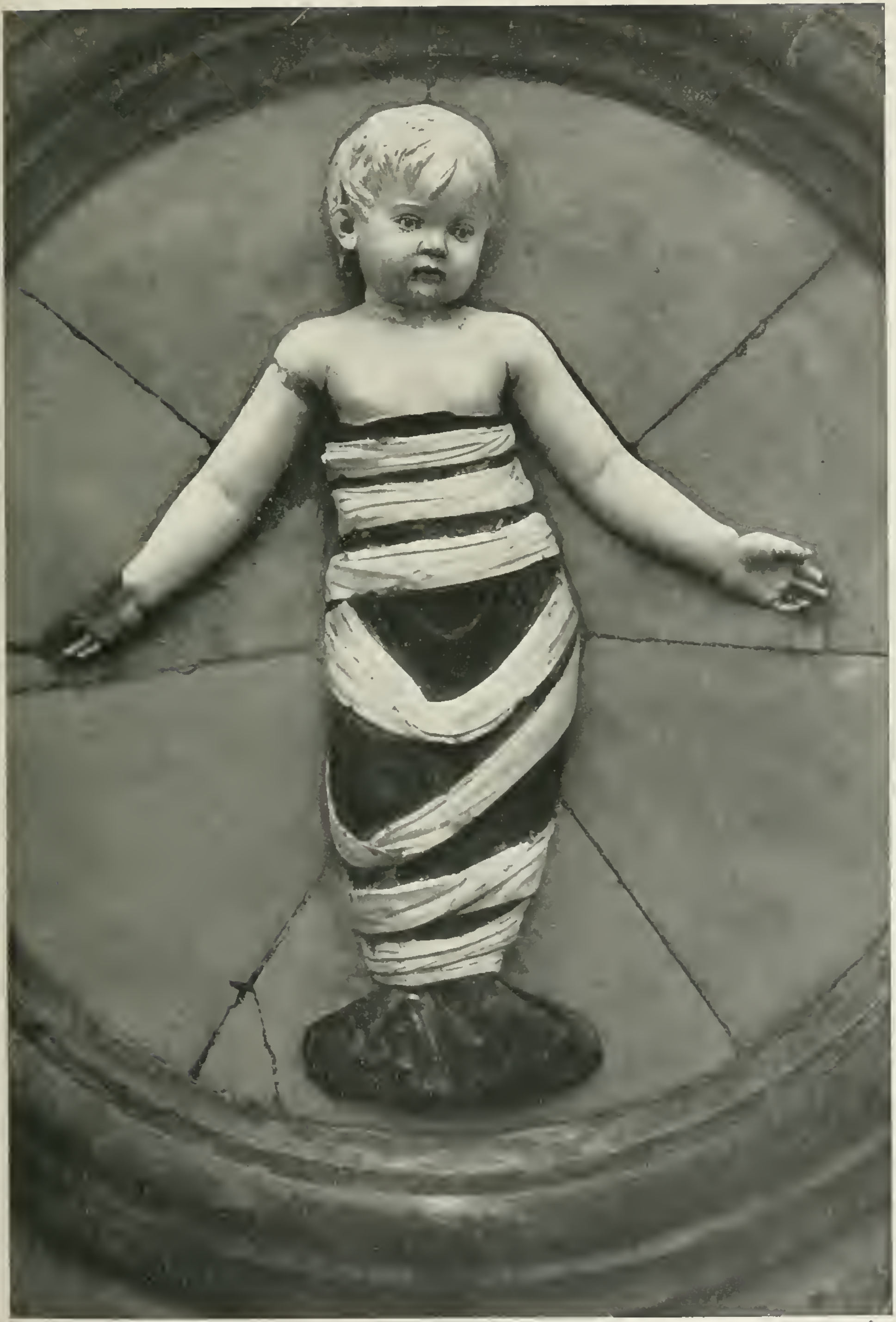
BAMBOO' (Malay, *Cambu Mambu*). *Bambusa*, *Arundinaria*, and *Phyllostachys*. Genera of grasses, many species of which attain a great size, some 70 or 100 feet in height, and have trunks a foot in diameter. The species are numerous, and are found in tropical and subtropical regions, both of the Eastern and Western hemispheres. They are of great importance to the inhabitants of the countries in which they grow, being found from sea-level to 12,000 feet in the Himalayas and 15,000 feet in the Andes. All of them have a jointed subterranean root-stock (rhizome) which throws up numerous stems. These are generally straight and erect; although one large species (*Bambusa agrestis*), common in dry mountainous situations in the southeast of Asia, has crooked and sometimes creeping stems. The stems grow to their full height unbranched, but afterwards throw out straight horizontal branches, especially in their upper parts, forming a dense thicket; and many of them being strongly armed with spines, they are planted for defense. Some of the smaller kinds are often planted as hedges. The stems are jointed like those of other grasses, very hard, but light and elastic, hollow, containing only a light spongy pith, except at the joints or nodes, where they are divided by strong partitions. They are, therefore, readily converted into water-vessels of various sorts; and when the partitions are removed, they are used as pipes for conveying water. They are also much employed for house-building, for bridges, etc. Split bamboo is extensively used for weaving into nets, for hats, umbrellas, fishing-rods, etc. The smaller stems are converted into water-sticks, and are employed in light wickerwork. In China, the leaf-sheaths and other portions of the stem are used for making paper. The stems of different species vary also very much in the thickness of the woody part, and so in their adaptation to different purposes. The external covering of the stem is, in all the species, remarkably siliceous; the stem of *Bambusa tabacaria* is so hard that it strikes fire when the hatchet is applied. This species is a native of Amboyna and Java; its slender stems are polished, and used for the stems of tobacco-pipes. The leaves of some kinds are used for thatch, and the Chinese plait hats of them. From the nodes of the bamboo there exudes a saccharine juice which dries upon exposure to the atmosphere, and which the Greeks called Indian honey. It is also sometimes named tabaris or tabasheer; but this name more properly belongs to a phosphorescent substance found in some species of bamboo and of other large grasses growing in dry situations. (See TABASHEER.) The young shoots of some kinds of bamboo are eaten like asparagus, or are pickled in vinegar. The seeds of some species are used as rice, and for making a kind of beer. Bamboos are generally of very rapid growth, and they are often found in arid situations, which would otherwise be destitute of vegetation. It is not improbable that they may yet be employed, where they do not naturally abound. The species common in the West Indies (*Bambusa vulgaris*) is supposed to have been introduced from the East Indies. A number of species are hardy in England and in parts of the United States, where they are used in landscape gardening. *Arundinaria macrosperma* is native to the Southern United States, where it forms extensive canebrakes.

FOSSIL FORMS. Fossil forms of bamboo are abundant in the Pleiocene deposits of France.

BAMBOO RAT. Any of various species of mole-rats (q.v.) of India and eastward, belonging to the genus Rhizomys, and found in and near bamboo jungles.

BAMBOROUGH (băm'bûr-ô) **CASTLE** (fortress of Bebba, Queen of Ida). An English castle situated in the village of the same name, 14 miles north of Alnwick, in Northumberland. It was erected by Ida of Northumberland in 547, and was repeatededly assailed in the wars of the Saxon and Danish kings. In 1095 it was held by Earl Mowbray against William II. During the Wars of the Roses, the fortress was destroyed, but was restored in the Eighteenth Century.

BAMBUK, bäm-bōōk'. A hilly region in West Africa, situated between the river Senegal and its tributary, the Faleme, and forming a part of the French possession of Sénégal. Except for its unhealthful climate, Bambuk is a well-favored country, with a very rich vegetation, and well adapted for cattle-raising. The special importance of Bambuk, however, lies in its gold deposits, which are so extensive as to be found almost in every part of the country. The output, however, is insignificant, as the exploration is entirely in the hands of the natives. The population, estimated by some at 800,000, consists of Mandingoes, who ostensibly profess Islam, but who are practically pagans and of a very ferocious disposition. Bambuk belonged to Portugal in the Fifteenth Century, and was brought under the protection of France in 1858.



BAMBINO

FROM THE SCULPTURE BY ANDREA DELLA ROBBIA IN THE FOUNDLINGS' HOSPITAL, FLORENCE

BAMIAN, bä'mē-än'. A valley and pass of Afghanistan, situated about 50 miles northwest of Kabul (Map: Asia, Central, L 3). The pass is at an elevation of 8496 feet, and is the only known pass over the Hindu-Kush for artillery and military transport. Considerable interest attaches to this region, on account of the historical remains in the form of numerous cells hewn in the rock, and the gigantic statues which seem to indicate that the place was once one of the chief centres of Buddhist worship. The two largest statues are found in a deep niche, and in spite of their dilapidated condition still show some traces of elaborate carving and painting. Each contains a winding stair, by which it is possible to ascend to the head. The whole valley is covered with the ruins of tombs, mosques, and other buildings, once belonging to the town of Ghulghuleh, which more recently occupied this site, and was destroyed by Genghis Khan in 1221. Eight miles eastward of Bamian lies the ancient fortress of Zohak, attributed to the fabulous Persian serpent-king of that name. The fortress is preserved for the purpose of guarding the important pass. Both there and in the valley of Bamian a great number of coins, ornaments, and other antiquities have been found.

BAMP'TON LEC'TURES. These lectures are so called after the name of their founder, the Rev. John Bampton, Canon of Salisbury (died 1751), who left estates originally worth £120 per annum, to the University of Oxford, for the endowment of eight divinity-lecture sermons, to be preached at Great Saint Mary's every year, and to be published, at the expense of the estate, within two months of their being preached. The preacher is to lecture on one of the following subjects: "The Confirmation of the Christian Faith and the Confutation of all Heretics and Schismatics;" "The Divine Authority of the Scriptures;" "The Authority of the Primitive Fathers in Matters of Christian Faith and Practice;" "The Divinity of Christ;" "The Divinity of the Holy Ghost;" "The Apostles' and Nicene Creeds." No person is qualified to preach these lectures who has not taken the degree of M. A., either at Oxford or Cambridge, and the same person shall never preach them twice. The first course was delivered in 1780. The more noteworthy of these lectures are those by White, in 1784, *Christianity and Mohammedanism;* Nott, in 1802, *Religious Enthusiasm* (against Whitefield and Wesley); Hampden, in 1832, *The Scholastic Philosophy Considered in Its Relation to Christian Theology;* Maurel, in 1858, *The Limits of Religious Thought;* Liddon, in 1866, *Our Lord's Divinity;* Farrar, in 1885, *History of Interpretation;* Cheyne, in 1889, *The Psalter;* Gore, in 1891, *The Incarnation;* Sanday, in 1893, *Inspiration.* The complete and official list of lectures will be found in the *Historical Register of the University of Oxford* (published yearly).

BAN (OHG. *ban, bann,* AS. *bann,* order under threat of punishment; hence Fr. *ban,* public proclamation). A word derived from a root signifying 'to signal,' 'to proclaim,' which meaning it retained in the phrase *bans* or *banns* (q.v.) of marriage. In feudal times it denoted a summons to arms, and also the military force thus summoned. The latter meaning it retains in several countries of Europe—as in France, where the National Guard is classed as the *ban* and the *arrière-ban,* or reserve; and in Germany, where the two divisions of the *Landwehr* are distinguished as the first and second *bans,* respectively. In the Middle Ages, the *Acht* or *bannum* was a sentence of outlawry pronounced against those who escaped from justice, or refused to submit to trial. We often read of refractory princes, and even cities in Germany, being placed under the *ban of the Empire.* The following are the terms of banning used in an old formula: "We declare thy wife a widow and thy children orphans; we restore all thy feudal tenures to the lord of the manor; thy private property we give to thy children, and we devote thy body and flesh to the beasts of the forest and fowls of the air. In all ways and in every place where others find peace and safety, thou shalt find none; and we banish thee into the four roads of the world—in the devil's name." Besides these sentences of outlawry, many other announcements were accompanied with denunciations and imprecations. When a grant of land was made for a religious purpose, or when a charter of liberties was granted, the transaction was proclaimed in public with certain ceremonies, and curses were denounced against any one who should violate the deed. Thus *banning,* or publishing, came to be associated with cursing; and hence the origin of the popular use of the word. It occurs in this sense in Shakespeare, Milton, and other early writers. The phrase 'ban of the Church' is the equivalent of the term excommunication (q.v.).

BAN, or **BA'NUS** (*ban,* in Southern Slavic and Hungarian, from Persian *bān,* lord; cf. Russ. and Pol. *pan,* master, lord). The title given to some of the military chiefs who guarded the southern boundaries of the Hungarian Kingdom. It is equivalent to the German *markgraf.* The Ban was appointed by the King and his appointment was ratified by the Diet. In political, judicial, and military affairs, his powers were almost royal, especially within his own territory. In times of war he led the troops of his *banat* (q.v.). Among the *banats* were those of Dalmatia, Croatia, Slavonia, and Bosnia. Their boundaries were constantly changing with the encroachments of the Turks. In the Sixteenth Century there was formed the double *banat* of Dalmatia and Croatia. In the reign of Maria Theresa the Ban was acknowledged to be the third dignitary of the Kingdom of Hungary; appointed a member of the Hungarian Council of Government, and President of the Council of the Banat; and was made the bearer of the Golden Apple (the symbol of sovereignty) at the coronation of the King. In 1849, Croatia, Slavonia, and Dalmatia became Austrian crown-lands; but by the *Ausgleich* of 1867 Croatia and Slavonia were restored to Hungary, and continued as a banat, with a special local administration for internal affairs.

BAN, bän, Matija (1818-1903). A prominent poet of the Southern Slavs. He was born at Dubrovnik (Ragusa), where he received a good education, a part of which consisted in a thorough knowledge of French and Italian. He traveled extensively over the Balkan Peninsula, made his literary début with Italian lyrics (*Il terremoto di Ragusa; Il Moscovito; Radimiro*), and settled in Belgrade (1844) as tutor to the daughters of Prince Alexander Karageorgevitch. For their benefit he wrote *The Woman's Educator*

(3 vols., Belgrade, 1847). From 1849 till 1853 he published the literary magazine *Dubrovnik*, at the city of the same name. Besides a drama, *Mejrima*, he published in his native tongue *Various Songs* (1853), mostly on erotic and political themes, and the following year was appointed instructor in French and Italian at the Belgrade Lyceum. The adverse criticism evoked by his ode addressed to the Sultan forced him to resign this post and spend the rest of his life in literary labors and travel. Among his tragedies the most noteworthy are *Dobrilo and Milenka; Tsar Lazar; The Death of Prince Dobroslav; Jan Hus* (1884); *Martha the Statholder; or, The Fall of Novgorod the Great* (1881).

BANA, bä'nȧ. A thousand-armed deity in Hindu mythology. His arms were cut off by Krishna, but his life was spared by the interposition of Śiva (q.v.) who was his friend.

BANA (seventh century A.D.). A Sanskrit author. His greatest works were two novels, the *Harshacarita*, or *Adventures of Harsha*, a historical romance, and the *Kādambarī*. Both of Bana's stories are largely indebted to the *Vāsavadattā* of Subandhu (q.v.). He also wrote the *Parvatīpariṇayanatakam*, or *Parvatī's Marriage*, based on the *Kumārasambhava* of Kalidasa (q.v.) and a farce, the *Sarvacarita*. A lost drama by him entitled *Mukuṭataḍitaka* is mentioned, and some have ascribed to him the Buddhist play *Nagānanda*, or *Joy of Serpents*, usually attributed to Harsha or to Dhavaka. Bana's lyrics are contained in his *Caṇḍūsataka*, or *Century of Durga*.

BANAK, băn'ak, or **BANNOCK** (native name *pan-iti*). A warlike tribe of Shoshonean stock, formerly roving over southern Idaho and eastern Oregon, and now concentrated upon the Fort Hall and Lemhi reservations, Idaho. Their language is the same as that of the Piute of Nevada. The Banaks of Lemhi number only 90. Those at Fort Hall are confederated with the Shoshoni, the two tribes together numbering 1400 persons, "so intermarried and related to each other that it is nearly impossible to distinguish one from the other."

BANANA, bȧ-nä'nȧ. The only seaport of the Congo Free State, and situated on a small peninsula on the western coast of Africa, at the mouth of the Congo (Map: Congo Free State, B 4). The town contains a number of foreign factories, and has a white population of about 120. The port is connected by steamship lines with Hamburg, Liverpool, and Antwerp.

BANANA, bȧ-nä'nȧ (Sp. the fruit of the tree *banano*). A name applied alike to the well-known fruit and to the plant which bears it. The specific name, *Musa sapientium*, signifies 'muse of the wise,' and is intended to convey an allusion to a statement by Theophrastus concerning a fruit which served as food for the wise men of India, and which, from his description, is supposed to have been the plantain or banana. The names plantain and banana are somewhat vaguely used in their application to different cultivated varieties. The banana is a tropical plant grown for its fruit, fibre, and the beauty of its foliage. It is evidently of Indian origin, but is now extensively cultivated in all tropical countries of the world. It is a large herbaceous plant with a perennial root or rhizome, from which the plant is perpetuated by sprouts or suckers. The young plants may be transplanted after attaining a height of 3 feet, by cutting them loose with a spade; such plants should be set deeply in rows 8 to 12 feet apart, so that the broad leaves will shade the ground. It can be increased by root-cuttings planted shallow and covered with peat or peaty compost. Young plants of this sort must be transplanted to full light, and be given ample room as soon as two or three leaves have formed. The banana begins to bloom in 1½ to 2 years after being established. The flower-bud is a peculiar, large heart-shaped formation which, on developing, exposes a true flower under each of its scales. From 50 to 150 of these may be developed in a single bud, from which a bunch containing as many bananas will develop. The plant grows from 10 to 40 feet in height and carries a whorl of broad ornamental leaves at the top of the stalk. A stalk bears but once, dies down, and is replaced by sprouts, 2 or 3 of which are allowed to bear.

The species grown for their fibre, as well as those grown for ornament, usually produce seed, while the edible banana of commerce is seedless. Those which bear seeds are usually propagated by seeds, as it is more economical. Dwarf sorts are chiefly used for ornamental planting and landscape effect.

There are many varieties of the banana, but the variety most commonly grown is the Martinique, a large yellow fruit growing in large dense clusters. The *baraçoa*, or Red Jamaica, is now but sparingly grown as compared with a few years ago, and is seldom exported.

The consumption of bananas in the United States alone has developed from a few hundred bunches, in 1870, to $5,600,000 worth, in 1899. The fruit comes chiefly from the West Indies and Central America, although some is produced in Florida, Louisiana, and California. Banana flour is rapidly becoming a staple article of commerce. See also Plantain. For illustration, see Breadfruit Tree.

BANANA-BIRD. The name of several birds which feed on bananas. In the American tropics any species of oriole (*Icterus*) or a hangnest may be so called, though this is a book-name rather than one in common use. (See Oriole.) In Jamaica and the Antilles, the small honey-creepers of the genus *Certhiola* are popularly called banana-quits (see Plate of Creepers), and the African plant-cutters—glossy black, cuckoo-like birds of the genus Musophaga—are styled banana-eaters.

BANANA FAM'ILY. See Musaceæ.

BANANA-FISH. See Ladyfish.

BANANAL, bä'nȧ-näl' (also called Santa Anna). An island lying in the Rio Araguaya, Province of Goyaz, Brazil (Map: Brazil, G 6). It is over 200 miles long, with a width of 35 miles; has a fertile soil and forests of valuable woods. North of the centre is a lake of considerable size.

BANAS, bȧ-näs', or **BUNAS**, bŭ-näs'. A river of Rajputana, near the Aravalli Hills, and joining the Chambal after a northeasterly course of over 300 miles (Map: India, C 3).

BANAT, băn'at, *Ger. pron.* bȧ-nät' (for derivation see Ban). A common name applied to any district or territory under the administration of a ban, but specially used in connection with a district of southern Hungary comprising

BAMBOO, ETC.

1. GIGANTIC BAMBOO, from Ceylon.

2. PAPER BIRCH (Betula papyrifera).

3. GREAT BANYAN TREE, in Calcutta Botanical Gardens.

the three counties, Temes, Torontál, and Krassó (Map: Hungary, G 4). It has a total area of over 10,000 square miles, and is one of the most fertile and best-cultivated districts of Hungary. Owing to its mild climate and the rich soil yields, abundant crops of grain and southern fruits are raised, while the mountains contain rich mineral deposits, especially coal. Among its numerous mineral springs the best known are those of Mehádia. The district, which was at one time under the Turkish dominion, was uninhabited and covered with impassable forest and marshes, but was reclaimed under Maria Theresa in the Eighteenth Century, who drained the land by means of canals, and by free grants of land induced a considerable immigration from Germany, Turkey, and Servia, thereby laying the foundations of the present prosperity of the region. The population is naturally extremely heterogeneous, and amounted, in 1890, to 1,433-424. The principal town is Temesvár. From 1652 to 1716 the district was in the possession of the Turks. In 1779 it was united with Hungary. It was formed into an Austria crownland in 1849, but was restored to Hungary in 1860. See BAN.

BAN′BRIDGE. A town in County Down, Ireland, built on a steep slope on the left bank of the Bann, 76 miles north of Dublin (Map: Ireland, E 2). It is a thriving seat of the linen manufacture in all its stages, from the preparation of the soil for the flaxseed to the finishing of the finest linen. Miles of bleaching-greens exist in the vicinity, while there are numerous factories along the Bann. Population, in 1891, 4901.

BANBURY, băn′bĕr-ĭ (anciently Berenburig, Bera's fort). A market-town in Oxfordshire, England, on the Cherwell, and the Oxford Canal, 23 miles north of Oxford (Map: England, E 4). Banbury is the centre of the famous rich red land of Oxford County. This land is among the most fertile in the kingdom. Banbury is noted for its manufacture of agricultural implements, and for its malt liquors, cheese, and cakes. It was a stronghold of Puritanism in the Seventeenth Century, and the term 'Banbury man' came to be applied, as a term of derision, to the typical Puritan. The old 'Banbury Cross,' famous in the nursery rhyme, is replaced by a modern one. Population, in 1891, 12,767; in 1901, 12,967. Consult Beesley, *History of Banbury* (London, 1841).

BANC (OF. *banc*, Low Lat. *bancus*, MHG. *banc*, Ger. *Bank*, bench). In law, the bench or seat of judgment. Hence, the sittings of a superior court of common law, composed of more than one judge, to determine questions of law; or the sittings of a full court or quorum, as distinguished from the sittings at *nisi prius* (q.v.), or by one judge, for the purpose of trying issues of fact, are called 'sittings in banc' or 'in banco.' The term is in use in the United States as well as in England. See BENCH; COMMON BENCH; and COURT.

BANCA, băn̲′kȧ, or **BANKA.** One of the Dutch East Indian islands, northeast of Sumatra, from which it is separated by the Banca Strait. It is of an oblong shape and covers an area of about 4446 square miles. (Map: East Indies, C 5). Its surface is generally flat, although it has some elevations on the northern and southern ends. The climate is moist and unhealthful for Europeans. The most important product of the island is tin, which has been mined by the Government since 1832. The annual export of that metal is about 5000 tons. The flora is remarkable. The principal articles of import are rice and salt. The population of Banca is estimated at 94,000, of which about 200 are Europeans and over 25,000 Chinese. Administratively, Banca, together with a few adjacent small islands, constitutes a separate residency.

BANCA, băn̲′kȧ. A small boat, used in the Philippine Islands. It is shaped from a single log, and therefore belongs to the class called 'dugouts.' Practically all of them are fitted with outriggers like the proas. The crosspieces are usually of bamboo, and the float is often of the same material. A few of the boats are of rather large size, are built with frames and planking, and have a schooner rig.

BANCO, băn̲′kō (It., bench, counter, bank). A commercial term meaning the standard money in which a bank keeps its accounts, as distinguished from the current money of the place. The distinction was more necessary when the currency consisted, as it often did, of clipped, worn, and foreign coins. These the early banks (at Venice or Amsterdam, for instance) received at their intrinsic worth, and credited the depositor in their books with this bank value. The term was chiefly applied to the money in which the Hamburg bank kept its accounts, before the adoption of the new universal coinage of the German Empire. It was not represented by any coinage.

BANCROFT, băn̲′krŏft *or* băn′krŏft, CECIL FRANKLIN PATCH (1839-1901). An American educator, born at New Ipswich, N. H. He graduated in 1860 at Dartmouth College, and in 1867 at Andover Theological Seminary, and in the latter year was ordained to the Congregationalist ministry. In 1860-64 he was principal of the Appleton Academy at Mount Vernon, N. H., and in 1867-72 of the Lookout Mountain Educational Institutions, Tenn. In 1873 he was appointed principal of Phillips Academy, Andover, Mass. It is said that he prepared for colleges and scientific schools more students than any other secondary school instructor in the United States. He published many contributions in periodicals, and made numerous public addresses.

BANCROFT, EDWARD (1744-1820). An American naturalist, traveler, and author, most widely known as a traitor to the American cause in France during the Revolutionary War. He was born at Westfield, Mass., ran away to sea, and after a time settled in Guiana, where he practiced medicine. Afterwards he moved to England, published a *Natural History of Guiana* (1769), and was on the staff of the *Monthly Review*, for which he wrote articles advocating the cause of the American Colonies. Charged with arson in 1777, he fled to Paris, and there became a spy, first of the Americans, and then of the British. Soon after arriving he seriously injured the American Government, then much in need of arms and supplies, by betraying to the British information of a prospective shipment of materials of war from France to the United States, he having received the information from his former schoolmaster, Silas Deane, then a commissioner of the Continental Congress. Subsequently he made discoveries in dyeing through which he acquired wealth. He also published *Experimental Researches Concerning Permanent Colors* (1794-1813).

BANCROFT, George (1800-91). An American historian. He was born at Worcester, Mass., October 3, 1800, and as the son of the Rev. Aaron Bancroft, a Unitarian clergyman, the author of a *Life of Washington,* he inherited the blended qualities of the historian and the ecclesiastic. He was trained at Exeter, N. H.; entered Harvard College at 13, and on his graduation in 1817 went to Göttingen, where he took the degree of Ph.D. in history, being among the first of Americans to study there. His studies were in German, French, and Italian literature, in the classics, Arabic, Hebrew, history, and natural sciences. To an American classmate in Germany he was 'Little Bancroft,' but yet "a most interesting youth, with the promise of greatness." Leaving Göttingen in 1820, Bancroft went to Berlin, enjoying the society of Schleiermacher, Wilhelm von Humboldt, Varnhagen von Ense, and other distinguished scholars. He studied also at Heidelberg, and on a visit to Jena met the venerable Goethe at Weimar. Returning in 1822 to America, he became tutor in Greek at Harvard, and, essaying his father's profession, preached occasionally with moderate approval. But literature soon claimed him. In 1823 he published a volume of verse, and with Dr. Joseph G. Cogswell opened a school at Northampton. In the next year he published a translation of his former teacher, Heeren's *Politics of Ancient Greece,* and in 1826 an *Oration,* advocating universal suffrage as the foundation of true democracy. He might now have entered upon a political career. In 1830 he was elected, without his knowledge, to the Legislature, but he declined to serve, and in the next year refused a nomination. Already he was absorbed in his great historical work, *The History of the United States,* of which the first volume appeared in 1834, and the tenth 40 years later. In this form the book was published in 6 volumes (1870-76), 2 concluding volumes (XI. and XII.) were published (1882) as a *History of the Foundation of the Constitution of the United States,* and the whole appeared in a final revision in 6 volumes (1884-85), as the *History of the United States, from the Discovery of America to the Inauguration of Washington.*

But though this bulky history occupied thus the central position in the labors of a lifetime, it did not engross Bancroft's scholarly activities. In 1830-35 he wrote a *Political Address* to the people of his State, at the request of the Young Men's Democratic Convention, and, giving up his school, moved to Springfield, where he gave himself wholly to historical studies, till, in 1838, he was made collector of the port of Boston by President Van Buren. The Democratic party nominated him for governor in 1844. He failed of election by a small margin, and was appointed Secretary of the Navy by President Polk. His management was marked by the establishment of the Naval Academy at Annapolis, which was devised and organized on his sole initiative by an ingenious straining of executive authority. He also fostered the work of the Washington Observatory, and raised the standard of professorial instruction. He showed diplomatic foresight and decision in constantly renewed orders to the American Pacific Squadron to seize California in case hostilities should break out with Mexico—orders executed with far-reaching results. Acting temporarily as Secretary of War, it fell to him to give the command to march troops into Texas. His services at Washington led to his appointment as Minister to Great Britain (1846-49), where he procured modification in the laws of navigation and allegiance. On his return in 1849, Bancroft lived in New York, devoting himself to historical studies, interrupted by diplomatic services as Minister to Prussia in 1867, to the North German Confederation (1868), and to the new German Empire in 1871. From this post he was recalled at his own request in 1874. While Minister at Berlin he assisted in the settlement of the Northwest Boundary dispute between the United States and Great Britain. Oxford made him a D.C.L. in 1849, and Bonn a J.U.D. in 1868. His miscellaneous publications are very numerous. Among the more important may be named an oration at Springfield (July 4, 1836); *History of the Colonization of the United States* (1841); and an *Oration* in commemoration of Andrew Jackson (1845); *The Necessity, The Reality, and the Promise of the Progress of the Human Race* (1850-54); *Memorial Address on Abraham Lincoln* (1866); *A Plea for the Constitution of the United States* (1886); and *Martin Van Buren* (1889). His last address was at the opening of the third meeting of the American Historical Association, April, 1886. His old age was spent in Washington and at his summer home at Newport in charming domesticity. Bancroft was twice married. He died at Washington, D. C., January 17, 1891.

As an historian Bancroft was a democratic idealist. He had more faith in mankind than in the individual, more belief in universal than in personal equality. His zeal for justice was deep, but occasionally misdirected; his patience in gathering materials indefatigable; his literary composition labored and frequently over-elaborated. There is a tendency to ponderous expression and to philosophic discursiveness; but, though somewhat out of tune with the historic spirit and the literary taste of our own day, his work exercised a very great influence on the generation of the Civil War in stirring and maintaining in the American people the inspiring conception of a continent dedicated to liberty.

Consult: Davis, "George Bancroft," in *American Academy of Arts and Science,* Vol. XXVI. (Boston, 1846-1900); Green, *George Bancroft* (Worcester, 1891); Rives, *Memorial of George Bancroft* (New York, 1867); Schuyler, *Correspondence and Remarks upon Bancroft's History of the Northern Campaign of 1777* (New York, 1867); Wallis, *Mr. Bancroft as an Historian* (Baltimore, 1896); West, *George Bancroft* (New York, 1900).

BANCROFT, Hubert Howe (1832—). An American historian, born at Granville, Ohio. After entering the book business in Buffalo, N. Y., he was sent to California in 1852 to establish a branch there. He became interested in the history of the Pacific Coast, and collected documents of all sorts relating to it. His business prospering, he practically retired in 1868, and gave himself up to historical work on a large scale, employing numerous assistants to explore and index his vast collection. Besides preserving the materials for the history of the Pacific region, he has published a monumental series of historical works with the aid of his collaborators, covering the history of Alaska, California, Nevada, Colorado, Wyoming, Arizona, New Mexico, Oregon, Texas, Utah, and Washington, several large volumes being devoted to the more important States. In addition he has published *The Native Races of the Pacific States* (1874-75), and histories of *Central America* (1882), *Mexico* (1883), and *British Columbia* (1887), besides *Essays and Miscellanies* (1890), and *Literary Industries* (1890), the last-named giving an account of his labors.

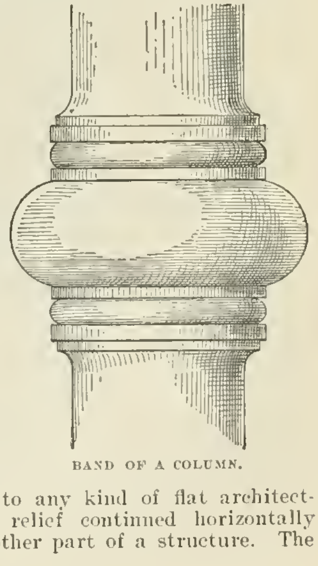
BANCROFT, Marie Effie Wilton, Lady. An English actress and manager. She was born at Doncaster, and as a child appeared on the stage with her parents, who were both actors. Among her early parts was that of Fleance in *Macbeth* (1846). After several years in the provincial towns she made her London début, September 15, 1856, at the Lyceum, as the boy Henri, in *Belphegor*, playing the same night in *Perdita; or, the Royal Milkmaid.* She won great popularity in several boy characters, in burlesques at various theatres, as Cupid in two different plays, and notably as Pippo, in the *Maid and the Magpie*, by H. J. Byron (q.v.), at the Strand Theatre (1858). For several years she remained at the Strand, taking numerous parts of the same general type. In April, 1865, she began, in partnership with Mr. Byron, the management of the Prince of Wales's Theatre, having secured as a leading actor Squire Bancroft (q.v.), whom she had met shortly before in Liverpool. The house soon became noted for its series of successful comedies by T. W. Robertson, realistically depicting certain features of the social life of the day, and staged with unusual attention to naturalness of detail. In successive years they have brought out *Society* (1865), *Ours* (1866), *Caste* (1867), *Play* (1868), *School* (1869), and *M. P.* (1870). Miss Wilton, who in 1867 became Mrs. Bancroft, regularly took the principal female parts in these pieces, her husband being leading man. Some of her best-known rôles were Mary Netley, in *Ours;* Polly Eccles, in *Caste;* and Naomi Tighe, in *School;* and also Lady Teazle in *The School for Scandal* (revived 1874); Zicka, in *Diplomacy* (1878); and Nan, in *Sweethearts* (1879).

Mr. and Mrs. Bancroft likewise presented at their theatre a number of prominent actors, among them Hare, Coghlan, the Kendals, and Miss Terry. In 1880 they moved to the Haymarket Theatre, a larger house, where they continued the successful presentation of modern comedy. July 20, 1885, they retired from the stage, and have since very rarely appeared, though in 1893 Mrs. Bancroft took part with her husband (who was knighted in 1897) in the revival of *Diplomacy* at the Garrick Theatre. She is the author of many of the most interesting portions of the volume of reminiscences called *Mr. and Mrs. Bancroft On and Off the Stage, Written by Themselves* (London, 1888).

BANCROFT, Richard (1544-1610). An English prelate, Archbishop of Canterbury. He was born at Farnworth, Lancashire, and was a grandnephew of Hugh Curwen, Archbishop of Dublin and Bishop of Oxford, who sent him to Cambridge, where he graduated B.A. in 1567, and M.A. in 1570. He was admitted D.D. in 1575. His first charge was the rectorship of Feversham, and a rapid succession of preferments led to his induction as Bishop of London in 1597. In this capacity he attended Queen Elizabeth during her last illness. He was named 'chief overseer' of the commission appointed by King James I. for the revision of the Bible. He became Archbishop of Canterbury in 1604, and Chancellor of Oxford University in 1608. A bitter opponent of Puritanism, he vigorously asserted the divine origin of episcopacy, and was arbitrary in his enforcement of conformity. He was a man of considerable attainments, an eloquent preacher, and a dignified statesman.

BANCROFT, Sir Squire, K.B. (1841—). An English actor and manager, born in London. He began his dramatic career in Birmingham in 1861. After playing for some time in Dublin and Liverpool he was invited to London by H. J. Byron and Miss Wilton, and made his first appearance at the Prince of Wales's Theatre, in April, 1865. His subsequent history is in constant connection with that of Miss Wilton, whom he married in December, 1867. (See Bancroft, Marie.) He continued with Mrs. Bancroft in the management of the Prince of Wales's Theatre, and, after 1880, the Haymarket, till July, 1885, when they retired together. After that his chief appearances were at the Lyceum in *The Dead Heart*, with Irving (1889), and in February, 1893, at the Garrick, in *Diplomacy.* He was knighted in 1897. Consult *Mr. and Mrs. Bancroft On and Off the Stage, Written by Themselves* (London, 1888).

BANCROFT, Wilder Dwight (1867—). An American chemist, born in Middletown, R. I. He graduated at Harvard in 1888 (A.B.), did a year of graduate work there (1888-89), and four years of special work in Strassburg, Leipzig, Berlin, and Amsterdam (1889-93). In 1892 he was given the degree of Ph.D. at Leipzig. He was assistant in chemistry at Harvard in 1889-90, instructor in chemistry there in 1894-95. In 1895 he was appointed assistant professor of physical chemistry at Cornell. He founded and became editor of the *Journal of Physical Chemistry* in 1895. His publications include *The Phase Rule* (1897).


BAND OF A COLUMN.

BAND. See Costume, Ecclesiastical.

BAND (from *bind*). In architecture, the general name given to any kind of flat architectural member in relief continued horizontally along a wall or other part of a structure. The special kinds of bands are indicated by separate terms, such as string-course, lintel, frieze, etc. Bands are sometimes simple, sometimes broken up into decorative details. The band of a shaft is the molding by which shafts are encircled in mediæval architecture. When several bands are placed on the body of the shaft they are known as shaft-rings.

BAND. Originally the term 'band' had general reference to any combination of instruments organized for the performance of instrumental music, in which sense it is still largely employed in England. In modern technical usage, it refers only to such combinations of instruments as are usually played on the march. Up to the Twelfth Century there had been no attempt at musical organization on the part of wandering or roving musicians—a condition due as much to the evil repute in which they were held as to the unsuitable character of their primitive instruments. About the Thirteenth Century, conditions had so far improved that recognition and sanction were conceded them, and bands of pipers and trumpeters came into existence.

So seriously did they value their art after this, that guilds were formed, the members of which elected a head or piper-king, who, in common with the rank and file of the membership, was pledged to see "that no player, whether he be piper, drummer, fiddler, trumpeter, or performer on any instrument, be allowed to accept engagements of any kind, whether in towns, villages, or hamlets, unless he had previously enrolled himself in the guild." The original guild was probably that of the Brotherhood of Saint Nicholas, organized at Vienna in 1228, which a hundred years later was placed under the control of a regularly appointed board nominated by the Austrian Government. From these guilds, town bands were formed throughout Germany and Austria, consisting for the most part of fifes, flutes, schalmey, bombard, zinkers or cornetti (six-holed horns, similar in shape to a cow's horn, and played with a special mouthpiece), bagpipes, viols, and drums. The development of the wind band (brass, wood-wind, and reed instruments) was curiously influenced by the peculiar restrictions defining the social status of every calling during the Middle Ages. Thus, the trumpets and kettle-drums were reserved exclusively for the nobility, and forbidden to ordinary minstrels. In some towns, stringent laws were passed forbidding bands of more than five or six pipers to play at an ordinary citizen's wedding, or other functions of similar importance; bands of greater strength, or the *full band*, being reserved for civic and religious occasions. The music played by such bands was learned by ear, and rarely put into writing, in order to add effect to the supposedly secret nature of their order. Between the Seventeenth and Eighteenth centuries, music began to be noted down, and the monotonous character of the band-music (due to the impossibility of their horns and trumpets giving the third and seventh of the dominant chord) was largely done away with by adding a few trumpets tuned in other keys.

At the beginning of the Eighteenth Century, instrumental music had separated very distinctly into the three or four great groups or divisions in which we find it to-day. The *full orchestra*, combining as it does every element and vehicle of musical expression, addressed itself to the musical intellects: while the *brass band* retained its mission as church and community music (a subject which is treated under BRASS BAND), and the *military band* appealed to the masses at large. The bands of to-day may be grouped as follows: (a) Drum and fife, or drum and bugle; (b) brass band; (c) military band. Drums, fifes, and bugles or trumpets have remained practically unchanged, and are now, as they always have been, inseparably connected with all that pertains to the life of the soldier. The brass band has ever been closely connected with the services of the Church, and in England has reached its highest development through the numerous workingmen's band organizations of Lancashire and Yorkshire. Such bands as *Besses-o'th'-Barn*, *Staylybridge Old Band* (under Alexander Owen, a celebrated leader), and similar bodies, in many instances composed entirely of coal-miners or factory operatives, have been reckoned among the most potent influences in the modern development of music among the masses of England. Brass bands are met with in the United States, but only where military bands are not possible. The military band as a musical organization (as a regimental or military feature, it will be found treated under BAND, MILITARY) is the modern representative of the original town band. The first French military bands, organized by Lully (q.v.) under the commission of Louis XIV., consisted of a quartet (soprano, alto, tenor, and bass) of oboes, with regimental drums for all of which he wrote separate parts. The music of the town bands was performed by all the instruments in unison. Queen Elizabeth's band had consisted of ten trumpets and six trombones, besides a few other instruments. The Lully of the Germans was a civilian musician named Wieprecht, who, because of severe opposition, succeeded in getting his scheme of instrumentation introduced into but a single Prussian regiment. Sax (q.v.) of France succeeded in the introduction of similar reforms in the army of Napoleon III. The invention and rapid improvement of the clarinet (see BAND, MILITARY) marked a new era, and it became as important and essential a feature of the military band as is the violin to the orchestra. Next followed the invention of the bassoon (or *fagotti*) and French horns. The saxophone family (B flat soprano, F flat alto, B flat tenor, E flat barytone, and B flat bass), although practically the invention of the French bandmaster Sax, have only within the last few years become common to military bands generally.

The modern *concert military band* may be described as a result of the following causes: (1) A development of the brass band; (2) a desire to give more complete artistic expression to the increasing repertoire of band music; (3) the prominence given to the wind band, in the composition of the great modern orchestral composers. To the latter cause, and to the easy transition from orchestra to band of most modern orchestral compositions, may be indirectly attributed the great increase of the wood-wind section of the concert band—flutes, oboes, clarinets, and contra-bassoons (*contra fagotti*). An instance of this may be found in Wagner's 'Elizabeth's Prayer,' where the wood-winds are used alone. Similarly, in many of the most beautiful passages of the Nibelungen music, the strings are not used at all. The reflex influence of such music on the concert band has been to cause the invention and introduction of new instruments, in order to secure the desired tone color. The military concert band has received its greatest impetus in the United States, where it may be said to have been inaugurated in the Fourth of July concerts given by the Boston City Government as a feature of the regular Independence Day celebration usually held on the historic Common. The series of promenade concerts which followed met with remarkable success, and brought Patrick Sarsfield Gilmore (q.v.) into prominence as a bandmaster. D. W. Reeves succeeded Gilmore at the latter's death, but soon resigned in favor of Victor Herbert, who is held to have rivaled John Philip Sousa (q.v.) in the advancement of the military band. The organization known as Sousa's Band, marked at the beginning of the Twentieth Century what was universally regarded to be the highest type of concert military band. Sousa, who had attained national eminence in connection with the United States Marine Band at Washington, resigned his position in order to devote himself to concert work entirely, with a band whose membership was as carefully recruited as those of the great orchestras. The band of the French Garde Républicaine was his model, and he has succeeded in placing his organization at the head of the concert bands of the world.

BAND INSTRUMENTATION for brass, military, and concert bands is as follows: *Brass* (if of 10 pieces), E flat tuba, barytone, 2d alto, B flat tenor, E flat cornet, 1st alto, 2d B flat cornet, 1st B flat cornet, bass drums and snare drum. For a band of 20 pieces, the following instruments are added: 1 solo, A flat cornet, and 2 1st B flat cornets; 1 3d B flat cornet; 1st, 2d, and 3d trombones, and 1 B flat bass. The average military band is composed as follows: 2 1st B flat clarinets; 2 seconds, and 1 3d B flat clarinet, 1 piccolo, 1 E flat clarinet, 2 1st B flat cornets, 1 2d and 1 3d B flat cornets, 1st, 2d, and 3d altos, 1st, 2d, and 3d trombones, oboe, glockenspiel, saxophones (occasionally), barytone, B flat bass, E flat tuba, bass drum and snare drum. The concert military band includes such additions to the regular military band as are demanded by the programme undertaken. String bass, glockenspiel, saxophones, contra-fagotti, and tympani are invariably added.

BAND, MILITARY. In the army service, an organized body of musicians, instrumentalists, under a bandmaster or chief musician, generally assigned to each regiment of cavalry and infantry, and to the headquarters of the branches of the service. Military bands of one form or another are coeval with military bodies themselves. Every ancient nation had its peculiar music, instruments, and national songs. If tradition assigns the reed, lute, and string to the shepherd and herdsman, it is no less the authority for imputing the jarring instruments of percussion and strident brass to men of war. Ancient songs referred invariably to great victories, memorable sieges, and valorous deeds, and were sung in camp and on the march. With the Spartans, the song of Castor was the signal for combat; the Romans charged to the musical accompaniment of trumpets and horns; while the ancient Germans preferred the more complex aggregation of drums, flutes, cymbals, and clarions. At the beginning of the period of the Middle Ages, the instruments handed down and preserved by most European nations were those used in the rallying of troops, calling them to battle, or enlivening a fatiguing march with the few crude melodies of which they were capable.

In France the minstrels and troubadours greatly aided instrumental progression. They would frequently accompany the troops on the march and to battle, having as instruments the rebec, a small, three-stringed violin; the bagpipe, and the flute, or fife, to which, in 1330, was added the clarion. The cornet, another war instrument of the ancients, made its appearance about the same time. Toward the end of the Fifteenth Century regularly organized military bands began to make their appearance, their collection of instruments comprising drums and trumpets principally, which, in the case of the Italian bands, was further augmented by the pandean pipes, together with the flute and fife. The drummer used a single stick. Bagpipes and violins were added about the beginning of the Sixteenth Century, the invention of the former instrument belonging to the Alps or Piedmontese inhabitants.

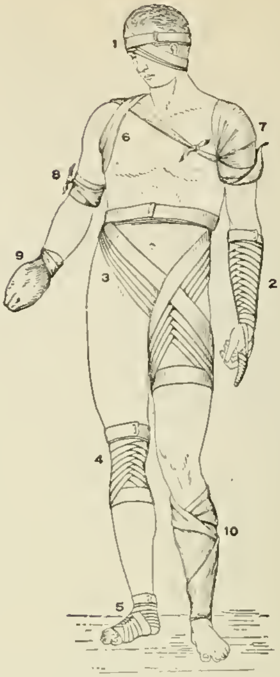
The Swiss mercenaries, in 1535, introduced into France the combination of fife and drum, which has ever since, and in nearly every land, been the popular musical vehicle for the expression of martial spirit.

In the Seventeenth Century the Prussians introduced the hautboy, which was given to the dragoons and musketeers of the Guard. To the Eastern nations, through the Hungarians, we owe the kettledrums, bassoon, and true flute; to the Italians the tambourine; to the Hanoverians the modern horn; and to the Turks the cymbals and big drum. The entire musical scheme of military bands at the beginning of the Eighteenth Century, was a combination of all these instruments, with the addition of the cavalry trumpet. The average infantry band consisted of drums, fife, horn, bassoon, big drum, and cymbals; the cavalry bands of hautboy, bagpipe, and kettledrums. The bassoon, hautboy, horn, and trumpet, however, were indifferently employed by either troops. A French ordinance dated April 19, 1766, appoints a band of music to each regiment. New instruments making their appearance are: the clarinet (q.v.), which, however, is not incorporated into the band until 1755; the serpent, triangle, and trombone, each entering successively and from different sources. Practically it was not until 1792 that military music and military bands began the development that has brought them to their present high state of efficiency. In England, officers hired civilian musicians to act as the band of their respective regiments—a system which obtained until the foundation of Kneller Hall (q.v.) in 1857; but in France and Russia bands were part of the army organization. About this time the individual bandmaster becomes prominent as the great factor of progress, among the most important of whom must be placed the famous Neithardt, born August 10, 1793, who, when still a young man, was for two years bandmaster of the Garde-Schützen Battalion, and afterwards for twenty years the bandmaster of the Kaiser-Franz Grenadiers. This latter band he brought to a high state of perfection. Progress in England must be credited largely to Charles Godfrey, born 1790, who in 1813 joined the band of the Coldstream Guards as a bassoon-player, became bandmaster, and remained such until his death in 1863. In the United States, Patrick Sarsfield Gilmore, born December 25, 1829, was the moving spirit. His first band was organized in Boston, 1859, but shortly afterwards he became a bandmaster in the Federal Army, serving throughout the Civil War. He was world-famous for the novel effects he produced in military music, on occasions using musketry and artillery guns to increase his musical effects. Bands in the United States Army are recruited generally for that specific purpose, the members being enlisted men, and usually consist of 28 men, all ranks. (For pay of same, see article PAY AND ALLOWANCES.) Instruments are supplied by the Quartermaster's Department.

In England bandmasters are specially trained at Kneller Hall, and on appointment receive warrant rank, with pay at 5 shillings per day, and £70 per annum from the band fund. The men are generally recruited as boys, from 14 to 16 years of age, usually from military institutions, schools, and training-ships. The official establishment of British Army bands is 31 all told for infantry, and 23 for cavalry; but without exception this number is greatly increased at the personal expense of the officers of the regiments, who pay for all extra men, music, and instruments. A thoroughly trained, fully equipped, numerically strong band is often a point of regimental rivalry, and while it has succeeded in endowing the British Army with the best bands in Europe on an average, it has been done only at the expense of officers, already financially overtaxed. The following bands are considered among the leading military bands of Europe: The Royal Artillery, Royal Marine, and Guards Band, of England; the Kaiser-Franz Grenadier Band, of Germany; the Guides' Band, of Belgium; the Garde Républicaine Band, of France; the Imperial Guards' Band, of Austria; the Ottoman Palace Band, of Turkey; the Bersaglieri Band, of Italy; the Czar's Regiment of Guards' Band, of Russia.

For fuller details the reader is referred to *United States Army Regulations* for composition and equipment of United States Army bands; Grove, *Dictionary of Music* (London, 1894), for biographies of military music composers and bandmasters; and the article "Militärmusik," by Rode, in the *Musikalisches Conversations-Lexicon* (Berlin, 1877).

BAN′DAGE (Fr., from *bande*, a strip, cf. BAND). A strip of woven material used by surgeons to apply pressure on a part, or to retain dressings upon wounds. The most common bandage is a strip of linen, flannel, muslin, or cheese-cloth, from 1 to 5 or more inches in breadth and 10 yards long, rolled longitudinally: the roller bandage. It is applied to a limb in a spiral, each turn overlapping the preceding about one-third of its width and adjusted to tapering or enlarging parts of the limb by reversing the bandage, or turning it back upon itself. It must be applied smoothly, so as to exert even pressure. There are also bandages to suit special purposes, as the four-tailed for the head or knee, which consists of a piece of cloth split up on each side toward and nearly to the centre. When applied, the tails are crossed and tied so as to make an extemporaneous nightcap. In the packets supplied to soldiers of the German Army, and to members of an ambulance corps, as well as to members of 'first aid to the injured' societies, are large handkerchiefs, to be used as triangular bandages, slings, or, when folded, short roller bandages. Roller bandages of crinoline, rubbed full of fresh plaster of paris, are used in making plaster splints in case of fracture, etc. They are thoroughly wet first and then applied rapidly.



BANDAGES APPLIED.

Roller Bandages: 1, eye; 2, finger, wrist and forearm; 3, groin; 4, knee-cap; 5, foot and ankle. Triangular Bandages: 6 and 7, shoulder; 8, upper-arm. 9, hand; 10, leg.

BANDAI-SAN, bän′dī-sän′ (Jap., Bandai mountain). A volcano of Japan, situated near the centre of the island of Nippon (Map: Japan, F 5). It consists of a number of peaks, none of which exceed a height of 6000 feet, situated around an elevated plain, on the northern side of Lake Inawashiro. The last eruption of the volcano occurred on July 15, 1888, when a tremendous mass of earth and rock was thrown out by the explosion of one of the craters, Ko-Bandai-san, and rolled down the mountain slopes into the Nagase Valley, devastating an area of over 27 square miles and destroying 461 people.

BANDA (bän′dȧ) **ISLANDS.** A group of 10 or 12 small islands in the Dutch East Indies, a dependency of the Moluccas (q.v.) (Map: Australasia, E 3). The two largest islands are Banda Neira and Banda Lontar, the former the seat of the Resident. Gunong Api is the highest island with an active volcano over 2200 feet above the sea, and constantly emitting smoke. Only a few of the islands are inhabited. Their total area is about 17 square miles, and the main products are nutmeg and mace. The capital is

Banda, on Banda Neira. It is well fortified, and has a good harbor. The population of the islands is about 8000, of which about 500 are Europeans. The Banda Islands were discovered in 1512 by the Portuguese, who were dispossessed by the Dutch in the Seventeenth Century. Since then they have shared the fate of the rest of the Molucca Islands (q.v.). Consult: Warburg, *Ein Beitrag zur Kulturgeschichte der Banda-Inseln* (Leipzig, 1897).

BANDAN′A (Hind. *bāndhnū*, from the dyeing of wares with those parts tied [*bāndh*, cord, tie, band] that are to remain undyed). A printed handkerchief of Indian origin, now extensively made in America, usually of cotton. The cloth is first dyed Turkey-red, and then the pattern is made by discharging the color with bleaching liquor in a hydraulic press. The pattern to be discharged is cut out on two plates of some metal, such as lead, which is not acted on by the liquor, the plates being the full size of the handkerchief. A dozen or more handkerchiefs are put in at once between the plates, and so many of these courses are entered together as will fill the press. Then the pressure is applied, and the liquor is run in on the uppermost plate, which is grooved on the upper side to receive it, and holed to pass it from plate to plate through all the cloth-folds in the press. The pressure on the cloth to make clean work by preventing the spreading of the liquor is enormous. The patterns in the real bandana style of printing are spots and diamond prints, the best suited for discharging, and even for these a pressure of 500 tons is required to work them clean.

BANDA ORIENTAL, bän′dá ō′rê-ĕn-täl′ (Sp., eastern shore). A name formerly used to designate the South American country of Uruguay.

BANDEL, bän′dĕl, ERNST VON (1800-76). A German sculptor. He was born at Ansbach, and made his artistic studies at the Munich Academy. After some years in Nuremberg and Rome, he returned to Munich, where he made portrait busts. In 1834 he went to Hanover, and undertook, among other larger works, the colossal statue of the German hero Hermann or Arminius at Detmold, to which he devoted the best years of his life and a large part of his own resources. In 1871 the Imperial Government contributed 10,000 thalers to the work, and the statue was unveiled in 1875, the sculptor receiving a pension of 12,000 marks in recognition of his devoted services. For his life, consult Schmidt (Hanover, 1892).

BANDELIER, băn′de-lēr′, ADOLPH FRANCIS ALPHONSE (1840—). An American archæologist, born at Bern, Switzerland. He came to the United States, traveled under the direction of the Archæological Institute of America in New Mexico, Mexico, Arizona, and Central America, and went in 1892 to Peru, Bolivia, and Ecuador, under commission of Henry Villard. For several years he continued researches in the last-named countries in behalf of the American Museum of Natural History in New York City, whose important collection of Bolivian and Peruvian antiquities he made. He has published several works, including *The Art of War and Mode of Warfare* (1877); *Archæological Reconnaissance in Mexico* (1881); *Final Report of Investigations Among the Indians of the Southwestern United States, 1880-85* (1890-92); *The Gilded Man (El Dorado) and Other Pictures of the Spanish Occupancy of America* (1893).

BANDELLO, bån-dĕl′ô, MATTEO (1480-c.1562). Next to Boccaccio, the most widely known of all the Italian writers of *novelli*, or tales. He was born at Castelnuovo in Piedmont, educated at a convent in Milan, and in early life became a Dominican monk, but for many years resided at Mantua as tutor of the celebrated Lucrezia Gonzaga, in whose honor he composed a poem in eleven cantos. The decisive battle of Pavia, in 1525, which gave Lombardy into the hands of the Emperor, forced Bandello to escape to France; and here, in 1550, he was made Bishop of Agen by Henry II. He was still living in 1561. Bandello's principal work is his collection of 214 *novelli*, 3 volumes of which appeared in 1554, and the fourth after his death, in 1573. These tales belong to the type made familiar by the still more famous collections of the *Decameron* and the *Heptameron*, and, like the latter, have their origin for the most part in the *fabliaux* of the French trouveurs. They have been justly praised as a true mirror of their age, reflecting contemporary social life with a fidelity for which we may look in vain in the serious historians. Settembrini, who is none too favorable toward writers of this period, ranks Bandello next to Boccaccio, among Italian novelists, and praises him especially for his easy, conversational style and freedom from rhetorical affectation. He has been utilized successively as a source of inspiration by Shakespeare, Lope de Vega, Massinger, and Byron. The best edition of his works is that of Poggiali (9 vols., London, 1791-93).

BANDE NOIRE, bäNd nwär (Fr., black band). The name given in France after 1815 to those speculators who had bought up, at ridiculously low prices and in depreciated currency, the lands and houses confiscated from the Church and the émigrés during the Revolution. The opprobrious name was fixed on them on account of their vandalism in the destruction of magnificent works of art, churches, convents, and châteaus for the sake of the building material. It has, however, been alleged, on the other hand, that these men did considerable service to the community in removing old and useless edifices, and that their minute subdivisions, into lots, of the old territorial domains has favored agriculture and ameliorated the condition of the people. Consult Lavergne, *Economie rurale de la France* (Paris, 1877).

BAN′DEROLE (Fr., It. *banderuola*, a little banner, dimin. of *bandiera*, banner). A small streamer fixed immediately under the crook, on the top of the staff of a crozier, and folding over the staff. Also an architectural term for the flat inscribed band used in the Renaissance buildings, similar to those now used for mottoes on coats-of-arms.

BANDETTINI, băn′dĕt-tē′nê, TERESA (1763-1837), called also AMARILLI ETRUSCA. An Italian poet, born at Lucca. She first became a *danseuse*, but afterwards won great celebrity as an improvisatrice. She also wrote poems and plays. Because of her virtue and amiability, as well as her accomplishments, she was much honored throughout Italy, and was crowned with laurel at Rome, in 1794. Monti and Alfieri praised her. She married Signor Pietro Landucci, a gentleman of Lucca. Among the works that she left are: A tragedy, *Il Polidoro;* a poem, *La morte di Adonide;* a drama, *La Rosmunda;* and shorter poems, entitled *Rime diverse.*

BAND′FISH′. One of the several greatly compressed and much elongated marine fishes, principally of the family Cepolidæ. The red bandfish (*Cepola rubescens*), about 15 inches long, dwells in the Mediterranean, where, on account of its brilliancy, it is sometimes known as the 'fire-flame' and 'red-ribbon.' Species also occur in Asiatic waters, inhabiting quiet depths, where they are free from the action of the waves, which they could not withstand, and feed on seaweed and small shellfish. The name is also sometimes applied to the oarfish (q.v.).

BAN′DICOOT (perhaps a corruption of the native *pandi-kokku,* pig-rat). (1) The largest known species of rat (*Nesokia bandicota*), a native of India and Ceylon, where it is also known as Malabar rat and pig-rat, the latter being the significance of the Telugu word of which *bandicoot* is a corruption. Its body often exceeds a foot in length, is black above and grayish beneath, and has a long tail, very thick at the base. It frequents arid, hilly districts, where its flesh is a favorite article of food with the coolies, and is said to be delicate, and much to resemble young pork. It feeds chiefly on grain and roots, and is very destructive to gardens and to poultry, burrowing under walls to reach what it wants. "Its nests, when rifled, are frequently found to contain considerable quantities of rice, stored up against the dry season." It is not known north of the Ganges and Indus. (2) A small marsupial of the family Peramelidæ, and especially of the genus Perameles, whose species are scattered throughout Australasia. They have a shrewlike head and muzzle, with 10 cutting teeth in the upper jaw and only two in the lower. "They . . . live entirely in the ground, making nests composed of dried leaves, grass, and sticks, in hollow places. They are rather mixed feeders; but insects, worms, roots, and bulbs constitute their ordinary diet." (3) The Rabbit-Bandicoots belong to the cognate genus Perogale; and are larger, with harelike form and gait. Hence the commonest species (*Perogale legatis*) is known in its home (Western Australia) as the 'native rabbit.' It burrows, but its food and general habits are those of the bandicoots proper; and, like them, it frequently injures vegetable gardens. (4) A smaller relative is the pig-tailed bandicoot (*Chœropus castanotis*).

BANDIERA, bän-dyā′ra, Attilio and Emilio (1817 and 1819-44). Italian patriots. The two brothers came of a noble Venetian family; their father was an admiral in the Austrian service, and they themselves were officers of rank in the navy. Out of zeal for the cause of Italian independence, they entered into conspiracies against the Austrian Government, and carried on a correspondence with Mazzini, their idol, who was then in exile in England. In 1844 they were forced to flee to Corfu, whence they returned in the hope of stirring up an insurrection in Calabria. They were betrayed to the police authorities, and, with seven of their companions, captured as soon as they had landed. On July 25, 1844, they were shot in the market-place of Cosenza, while singing patriotic hymns and exclaiming 'Viva l'Italia!' The death of the two noble youths aroused the hatred of Liberal Europe against the Austrian tyranny in Italy, and prepared the way for the first movement of liberation in 1848. Consult Ricciardi, *Storia dei fratelli Bandiera e consorti* (Florence, 1863).

BANDINELLI, bän′dė-nĕl′lė, Bartolommeo or Baccio (1488-1560). An Italian sculptor. He was born at Florence, and was a pupil of his father, Michelangelo di Viviano, an able goldsmith, and of Rustici. He imitated the works of Michelangelo, whose "David," symbolic of Florentine freedom, he, the protégé of the Medici, attempted to surpass with a "Hercules and Cacus" (1534), placed like it in front of the Palazzo Pubblico. Ugly and exaggerated in form and sentiment, this group only succeeded in making its author the object of satire and ridicule. But Vasari's generally accepted charge that Bandinelli destroyed Michelangelo's famous cartoon of the "Bathing Soldiers" is probably due to that author's dislike of him. Through his industry many Italian cities were adorned with his statues and river-gods, but their treatment was so commonplace that they failed to elevate or inspire public taste. His best work is to be found in the marble choir-screen of the cathedral at Florence, wherein he has personified, in relief, figures of the virtues, and figures of prophets and apostles. There is grace in their conception, and they are intelligently arranged as to the space at command. In the choir of the Annunziata at Florence is a group representing "Nicodemus supporting Christ"; the Nicodemus is a portrait of Bandinelli himself. His other works include "Adam and Eve" and "Bacchus" (National Museum).

BAND OF HOPE UN′ION. The most important of the children's temperance societies of England, started with local unions in 1847. In 1855 the United Kingdom Band of Hope Union was formed, and later the Edinburgh, Scottish, and Hibernian unions. With the income derived from small weekly dues, they maintain lectures, agents, a publishing department, fêtes, and concerts. Illustrated lectures are given in elementary and common schools, institutions, reformatories, and workhouses. Children over seven years old may belong. The latest statistics indicate that there are over 15,000 bands of hope and juvenile temperance societies in Great Britain, with a membership of about 2,000,000. See Temperance.

BAN′DOLIER′, or **BANDOLEER** (Fr. *bandoulière,* It. *bandoliera,* shoulder-belt; cf. *band*). A cartridge-belt, worn over the shoulder; strongly made of stout canvas cloth, with a separate pocket for each cartridge or round of ammunition. It was extensively used by the Colonial troops of Great Britain and portions of the mounted infantry, and officers armed with the revolver, during the Boer War of 1899-1902. The first use of the bandolier as an article of military equipment dates back two centuries, when muskets were provided with matchlocks. The musketeers were furnished with gunpowder in small cylindrical boxes made of wood, tin, or leather, each containing sufficient for one charge.

Twelve of these little boxes were fixed to a belt called a bandolier, worn over the left shoulder.

BAN'DON, or **BAN'DONBRIDGE.** A town of the county of Cork, Ireland, on the Bandon, 12 miles southwest of Cork (Map: Ireland, C 5). Bandon was at one time a prosperous manufacturing town, with extensive cotton-spinning and weaving industries, which now have almost entirely disappeared; a considerable grain and provision trade is carried on, but the population, which was 9049 in 1841, had diminished in 1891 to less than 3500. The country around Bandon is very beautiful, well wooded, undulating, and pastoral. The river described by Spenser as "the pleasant Bandon, crowned by many a wood," has a course of 40 miles, 15 of which are navigable to Innishannon, 4 miles below Bandon.

BANDONG, bän'dŏng. The capital of the Preanger Residency in Java, situated in the western part of the island, and connected by rail with Batavia (Map: East Indies, C 6). It contains a fine park and plain in front of the Regent's residence, a school for native teachers, and a race-course. Population, estimated at 21,200.

BANDTKE, bänt'ke, or **BANDTKIE**, bänt'kye, JERZY SAMUEL (1768-1835). A Polish historian, philologist, and bibliographer. He was born at Lublin, and was educated at Halle and Jena. From 1811 until his death he was librarian and professor at Cracow. He wrote several valuable works, among which may be mentioned: *Polnisch-Deutsches Wörterbuch* (1806); *Polnische Grammatik für Deutsche* (1808; frequently reprinted); and *Geschichte des polnischen Volks* (3d ed., 1835).

BANE'BER'RY. See ACTÆA.

BANÉR, bȧ-nâr', JOHAN (1596-1641). A Swedish general in the Thirty Years' War. He was born at Djursholm, near Stockholm, entered the army in 1615, and early distinguished himself in the wars against Russia and Poland. He accompanied Gustavus Adolphus to Germany in 1630, and was conspicuous in the battle of Breitenfeld (1631), in which he repulsed Pappenheim and largely contributed to the victory. After the death of Gustavus Adolphus, he assumed chief command of the Swedish Army, and he invaded Germany with varying success, obtaining decisive victories at Wittstock (1636) and Chemnitz (1639). He failed in an attempt, in 1641, to capture the Emperor at Ratisbon, and died soon afterwards at Halberstadt.

BANFF, bămf. A seaport and the county town of Banffshire, Scotland, at the mouth of the Deveron, 45 miles north-northwest of Aberdeen (Map: Scotland, F 2). It forms a higher or inland town, and a lower or sea town, on the Moray Firth. The town is very well built, and the streets are clean and well paved. Among the noteworthy buildings are Banff Castle, a handsome town-hall with a lofty spire, and the academy, a fine building of classical style. There are a number of educational institutions, including several libraries. To the south of Banff is Duff House, the seat of the Duke of Fife, with a large park. A seven-arched bridge over the Deveron unites Banff with the seaport of Macduff, on the right bank of the river. The chief exports are corn, cattle, salmon, and herrings. Banff, with Macduff, Elgin, Cullen, Inverary, Kintore, and Peterhead, sends one member to Parliament. Population, royal and municipal burgh, in 1901, 3730; of parliamentary burgh, 7148. Its earliest known charter was granted by Malcolm IV., about 1163. Robert II., in 1372, made Banff a royal burgh. Archbishop Sharp, of Saint Andrews, was born here, in 1618. Consult Cramond, *The Annals of Banff* (Aberdeen, 1891-93).

BANFF. A popular health and pleasure resort in southwestern Alberta, Canada, on the Bow River and on the Canadian Pacific Railroad. The village (population, 250) is situated amid the grand scenery of the Rocky Mountains, and has a boiling sulphur spring, open-air swimming-baths, a fine hotel, and a sanitarium, all included in the Rocky Mountain National Park of Canada, of which Banff is the railway depot. Consult *Banff in the Canadian Rockies* (Montreal, 1900).

BANFFSHIRE. A county in the northeast division of Scotland, bounded north by the Moray Firth; east, southeast, and south by Aberdeenshire; west, by Elgin and Inverness shires (Map: Scotland, E 2). Its greatest length is about 59 miles, its greatest breadth about 31, its extent of seacoast about 30; estimated area, 641 square miles. The surface, especially in the south and southeast, is mountainous, interspersed with fertile valleys and fine pastures. The soil in many parts is very fertile and highly cultivated. Herring fisheries are extensively carried on, and the salmon fisheries of the Spey and Deveron are valuable. Banffshire is divided into the districts of Enzie, Boyne, Strathisla, Strathdeveron, Balveny, Glenlivet, and Strathavon. The chief towns and villages are Banff, Macduff, Portsoy, Keith, Cullen, Buckie, Dufftown, and Tomintoul. Population, in 1801, 37,200; in 1851, 54,170; in 1891, 61,684; in 1901, 61,500.

BÁNFFY, bän'fē, DESIDERIUS, Baron (1843—). A Hungarian statesman. He was born at Klausenburg, Transylvania, and educated at the universities of Leipzig and Berlin. He entered the Government service and became prefect (*Obergespan*) of various counties of Transylvania. As such he was ex-officio member of the House of Magnates. He was elected deputy and became president of the Lower House in 1892. On the resignation of the Wekerle Cabinet in 1895, he was intrusted with the formation of a new ministry, and during his administration rendered conspicuous service to the Liberal cause. He resigned both the premiership and his mandate as deputy in 1899.

BANG, băng, HERMANN JOACHIM (1857—). A Danish author, a nephew of Olaf Lundt, born in the island of Seeland, and educated at the Academy of Sorö and at Copenhagen. He is the author of the following popular novels, tales, and romances: *Haablöse Slägter* (1880); *Fädra* (1883; dramatized as *Ellen Urne*, 1885); *Excentriske Noveller* (1885); *Stille Eksistenser* (1886); *Tine* (1889); *Under Aaget*, a collection of novels (1890); *Teatret* (1892); *Ludvigsbakke* (1896); *Udvalgte Fortaellinger* (1899); *Liv og Död* (1900).

BANG, PEDER GEORG (1797-1861). A distinguished Danish jurist and statesman. He was born at Copenhagen, and in 1830 was appointed professor of law in the university there. He took an active interest in politics, was several times member and (1854-55) head of the Cabinet, and finally became justiciary of the Supreme Court. His uncle, Frederick Luding Bang (1747-1820), was a distinguished professor of medicine at the University of Copenhagen and author of a number of works on medical subjects.

BANGALA, bäṉ′gȧ-lȧ. A tribe of cannibal negroes on the Middle Congo. They are of warlike character, and have furnished excellent troops to the Congo Free State. See AFRICA.

BANGALORE, băṉ′gȧ-lōr′ (Hind., city of beans). A fortified town in the Native State of Mysore, India, 70 miles northeast of Seringapatam, in latitude 12° 58′ N. and longitude 77° 38′ E. (Map: India, C 6). It is the chief military station of the British in the territory, and the seat of the British Resident. It has manufactures of silk and cotton, and is especially noted for its carpets. The place is 3000 feet above the sea, and is remarkable for its salubrity: the temperature seldom rises above 90° or descends below 61°. The municipal water-supply is good and abundant, and European vegetables grow in the gardens. The town is well laid out, has handsome public buildings, and beautiful botanical gardens. The more prominent native structures are the Fort and the Maharaja's Palace. The chief institution, the High School or Central College of the province, is well attended. The military cantonment, housing a large British and native force, is on the northeast. Bangalore dates from the foundation of its fort in 1537. It was a favorite residence of Hyder Ali, and in 1791 it was stormed by the British under Lord Cornwallis. Population, in 1891, 180,300; in 1901, 159,000.

BANGE, bäNzh, VALERAND DE (1833—). A French colonel of artillery, who organized the present artillery system of the French Army. He was born at Balignicourt. In 1873, as director of the *atelier-de-précision* in the Dépôt Central in Paris, he reconstructed both the light and heavy field-pieces then in use, and the models he proposed in 1876 were adopted for the army in 1879. From 1882 to 1889 he was director of the Cail corporation, whose plants at Grenelle, Denain, and Douai he transformed into ordnance factories. He competed successfully with Krupp in 1884 for the contract to supply the Servian Government with field-pieces. Bange's gun has been also preferred by England, Italy, and Sweden. For the Antwerp Exposition of 1885 he made a gun of 34 centimetres (about 13¼ inches) calibre, 35 feet long, from which two projectiles weighing 600 kilograms (about 1320 pounds) were fired with charges of 200 kilograms (about 440 pounds) of powder, the range being 18,000 metres (about 12 miles); but the gun burst at the third discharge. Bange was the first to make effective use of the screw principle in the mechanism of the breech-block. For a description of his inventions, consult Hennébert, *L'Artillerie Krupp et l'artillerie de Bange* (1886).

BANGKOK′ ('City of wild fruit-trees'). The capital of Siam and the chief commercial city of the country, situated on both banks of the Menam, about 20 miles above its mouth (Map: Siam, D 4). It lies in a very low region, and covers an area of over 15 square miles. It is divided into numerous islands by the arms of the Menam, and a large portion of the population live in floating houses. With the exception of the royal buildings and the residences of the wealthier classes, the houses are built of wood and raised upon poles as a precaution against inundations, which are of common occurrence, owing to the low surface of the region. The portion of the city on the left bank of the river is surrounded by a high wall, about six miles in circumference. The part of the city adjoining the royal palace is beautifully laid out, with a number of parks and fine residences. The palace grounds are surrounded by a wall, inclosing the royal palace, the royal library, temples, theatre, harem, and the residences of the vast retinue of servants and attendants. The temples of Bangkok are numerous and gorgeous in the extreme. They are built of several stories, rising terrace-like one above another, the whole forming a pyramidal-shaped building, the several roofs being of glazed tiles of the most brilliant colorings, while resplendent pillars are richly decorated with gold. The interior is invariably profusely decorated with precious stones, porcelain vases, and numerous statues of Buddha. In one of the royal temples there is a gigantic image of the saint in a reclining position, about 140 feet long, and richly inlaid with mother-of-pearl and gems. Among the temples, or *wats*, the most magnificent are Wat Sekket, Wat Nun, and Wat Sutat.

As the chief port of Siam, Bangkok has an extensive commerce, which is chiefly in the hands of Chinese and Europeans. The former have succeeded in monopolizing the retail trade as well as many of the industries of the city. The chief exports are rice, teak, and other woods, fish, cattle, and animal products. The native industries are now almost entirely extinct, and the porcelain-ware, for which Siam was once famous, has now been replaced by the Chinese article. The shipping of Bangkok amounts to about 450,000 tons per annum, and is largely in British hands. There is regular steam communication with Singapore, Saigon, and Hong Kong.

The transportation in the city was formerly effected chiefly by boats, but at present Bangkok is provided with a line of omnibuses, a horse-car railway, and an electric line. A portion of the city is lighted with electricity. Bangkok is the seat of foreign embassies as well as of many consular representatives, including one from the United States. It is connected by rail with Korat and Paknam. The population is variously estimated at from 200,000 to 600,000, of whom only a small portion are Siamese, and about one-half Chinese, the remainder consisting of Burmese, natives of French Indo-China, and Malays. Bangkok was an insignificant village until 1766, when Ayuthia, the residence of the King, was destroyed by the Burmese, and Bangkok became the capital. Consult Massieu, "Une visite à Bangkok," in *Revue des deux Mondes*, Vol. II. (Paris, 1901).

BAN′GLE (Hind. *bangrī*, glass bracelet). A loose bracelet or armlet, generally of slender silver wire, and frequently strung with coins or ornamental pendants. Any number may be worn at one time. The bangle has a high antiquity, and many of the same form as those worn in modern times are represented on ancient works of art, and have been found at Pompeii, and in the tombs at Præneste.

BANGOR, bȧn′gôr (Gæl. *Beannchar*, pointed hill). A seaport town, and favorite watering-place in County Down, Ireland, on the south side of the entrance to Belfast Lough, 12 miles northeast of Belfast (Map: Ireland, F 2). It has manufactures of embroidered muslins. Bangor Abbey, founded by Saint Congall in 555, had 3000 inmates in the Ninth Century when it was destroyed by the Danes. The site is now occupied by the parish church. Population, about 4000.

BANGOR (Celt., high choir). An episcopal city, municipal borough, and seaport town, in the northwest of Carnarvonshire, North Wales, Great Britain, on the southeast bank of Menai Strait, 9 miles northeast of Carnarvon, and 60 miles west of Chester (Map: Wales, B 3). The town stretches southwest through a fertile valley, and consists chiefly of a narrow, crooked street, a mile long, bounded on the south by a steep hill which has been laid out in pleasure grounds. It consists of Upper and Lower Bangor. The grandeur and beauty of the surrounding scenery have long made it a favorite resort. Bangor is the oldest bishopric in Wales, founded in 550 by Saint Deiniol. The cathedral built by him was destroyed by the Saxons in 1071, rebuilt in 1102, and again destroyed by fire in 1402. The present edifice, built between 1496 and 1532, is a plain embattled cruciform structure 214 by 60 feet, with a pinnacle tower 60 feet high. There are numerous educational institutions, including the University College of North Wales, Independent, Baptist, and Normal colleges. The town has undergone much modern improvement. It was incorporated in 1883; has municipal water-works, gas and electric-lighting plants; maintains a free library, and has erected artisans' dwellings. Its chief trade is derived from the great Penrhyn slate quarries, 6 miles distant, which employ over 3000 men. The slates are exported to all parts of the world, and are also manufactured into tables, chimney-pieces, etc. Two miles west of the city the Menai Suspension Bridge, and Stephenson's famous Britannia Tubular Bridge, one mile to the south, span the Menai Strait. Population, in 1891, 10,000; in 1901, 11,300.

BANGOR. A city, port of entry, and the county-seat of Penobscot County, Maine, 137 miles northeast of Portland, at the head of navigation on the Penobscot River, and on the Maine Central and other railroads, and the Boston and Bangor Steamship Line (Map: Maine, F 6). The Kenduskeag Stream, which here empties into the Penobscot, divides the city, the sections of which are united by several bridges; and a bridge 1300 feet long, over the Penobscot, connects Bangor with the opposite city of Brewer. The city is the seat of the Bangor Theological Seminary (Congregational), founded in 1816, and has a fine custom-house of granite, a public library of about 47,000 volumes, the Eastern Maine Insane Hospital, and the Eastern Maine General Hospital. The grounds of the Eastern Maine State Fair Association are also in the city. Bangor is an important commercial and manufacturing centre with advantages of excellent water-power, and a good harbor, having a deep-water frontage of three miles. The lumber interests are very extensive; ice-cutting is of some importance; and there are large foundries and machine-shops, boot and shoe factories, trunk and valise factories, and manufactures of clothing, dairy products, flour, etc. In 1901 the value of the city's commerce was nearly $5,400,000, of which less than $1,200,000 was in the import trade. The government, under a charter of 1834, is vested in a mayor, elected annually, and a bicameral city council, which controls the appointments of most of the administrative officers, though some are nominated by the mayor, subject to the consent of the board of aldermen. The water-works and electric-light plant are owned and operated by the municipality. Population, in 1890, 19,103; in 1900, 21,850.

Bangor is one of the many places supposed to be the site of the mythical city, Norumbega (q.v.). In 1556, André Thévet, the cosmographer, seems to have visited the spot and reports that a French fort called 'Norombègue' was then in existence. The first permanent settlement was made in 1769 by Jacob Buswell, a 'soldier and hunter, boat-builder and cooper.' The place was known as 'Kenduskeag Plantation' until 1787, and as 'Sunbury' from 1787 to 1791, when it was incorporated as a town under the name of Bangor. In 1834 it was chartered as a city. Consult: *History of Penobscot County* (Cleveland, 1882); various articles in the *Bangor Historical Magazine*, Vol. I. (Bangor, 1886); and an article, "Annals of Bangor," in *The Maine Historical Magazine*, Vol. IX. (Bangor, 1895).

BANGO'RIAN CON'TROVERSY. See HOADLY, BENJAMIN.

BANGOR THE'OLOG'ICAL SEM'INARY. A Congregational theological school. It was chartered by the Massachusetts Legislature in 1814, opened at Hampden, Maine, in 1816, and removed to Bangor, Maine, in 1819, where it graduated its first class in 1820. The course of study covers three years, and is similar to that of other Congregational theological schools. The relation between the Seminary and the Congregational churches of the State has always been close, and to these churches the Seminary has furnished more than half of their pastors. In 1901 the library contained over 22,000 volumes, and the value of the college property, including buildings, was over $275,000. The number of students has of late years declined.

BANGOT, bän'gōt. A name applied to certain tribes of Manguianes in Mindoro. See PHILIPPINES.

BANGS, ISAAC SPARROW (1831-1903). An American soldier, born at Canaan, Maine. He was mustered into the Federal service in 1862 as captain in the Twentieth Maine Volunteers, participated in the battles of Antietam and Fredericksburg, was appointed lieutenant-colonel of colored troops in 1863, and was placed in command of the Eighty-first United States colored infantry. Subsequently he became colonel of the Tenth United States colored heavy artillery, and commanded Forts Jackson, Saint Philip, Pike, and Livingston, and the defenses of New Orleans. In 1865 he was brevetted brigadier-general of United States volunteers for gallant and meritorious service during the war.

BANGS, JOHN KENDRICK (1862—). An American humorist and editor, born at Yonkers, N. Y. He graduated at Columbia College, and has been associated with *Life*, *Harper's Magazine*, and *Literature*. In 1899 he became editor of *Harper's Weekly*, from which he retired in 1902. He became widely known through his *Coffee and Repartee* (1886) and *The Idiot* (1895), humorous productions which have been much enjoyed.

His *House-Boat on the Styx* (1896) contains much amusing anachronism, a vein of which effective use is also made in *The Pursuit of the House-Boat* (1897). His other works include *Mr. Bonaparte of Corsica* (1895); *The Enchanted Typewriter* (1899); *Uncle Sam, Trustee* (1902); and *Olympian Nights* (1902).

BANGS, LEMUEL BOLTON (1842—). An American physician, born in New York City. He graduated at the College of Physicians and Surgeons in 1872, and for a time was professor of genito-urinary diseases in the New York Post-Graduate Medical School and Hospital, and genito-urinary surgeon in Saint Mark's Hospital, New York. He has also been consulting surgeon for various other New York and Brooklyn hospitals, and attending surgeon at the Bellevue Hospital. He was president of the American Association of Genito-Urinary Surgeons in 1895, and is a member of the American Medical Association. He has written an *American Text-Book of Genito-Urinary Diseases* (1898).

BANGS, NATHAN (1778-1862). An American clergyman. He was born in Connecticut. He began to preach as an itinerant in 1801, labored for some years in Canada, and removed to New York in 1810. He was chosen agent of the Methodist Book Concern in 1820, and in 1828 became editor of the *Christian Advocate and Journal*. In 1829 he was elected bishop of Canada, but declined. He became president of the Wesleyan University in 1841, but soon afterwards returned to pastoral work in New York. Dr. Bangs was the author of numerous publications, the most important of which is the *History of the Methodist Episcopal Church* (4 vols. 1839-41).

BANGUED, bän-gād'. The capital of the Province of Abra, Luzon, in the Philippines. The province is situated in the northern part of the island, and has an area of 3280 square miles with a population of 49,702. The surface bears traces of volcanic origin, but is well wooded and fertile in the valleys. The capital is situated near the river Abra, 236 miles north of Manila. It was first settled in 1598. It has a telegraph-station. Population, in 1898, 13,417.

BANGWEOLO, băng'wê-ō'lō, or **BEM'BA**. A shallow lake of Central Africa, situated in the northern part of Rhodesia, between latitudes 10° 40′ and 12° 15′ S., and longitudes 29° 30′ and 30° 20′ E. (Map: Africa, G 6). Its total length from north to south is over 100 miles, but it is only half that amount in width. Its altitude is about 4000 feet above the sea. A large portion of its southern and eastern area is occupied by marshes thickly overgrown, and most of the open water is bordered by tall water-reeds. In the northern part are situated a number of small inhabited islets, the largest of which is named Kissi. The chief tributary of the lake is the Chambezi from the east, while its outlet is the Luapula issuing from its southern end, the lake discharging its surplus waters into the river in the wet season. The lake was discovered in 1868 by Livingstone, who died at Chitambo's, in Ilala, on May 1, 1873. Consult: Singer, "Der Bangweolo-See," in Vol. XLIV., *Petermanns Mitteilungen* (Gotha, 1898); Weatherley, "Circumnavigation of Lake Bangweolo," in *Geographical Journal*, Vol. XII. (London, 1898).

BANIAN, băn'yan or băn-yăn' (Skt. *vanij*, merchant, trader). In India, a merchant or trader generally. It is more particularly applied to the great merchants in the west of India, especially in the seaport towns of Bombay, Surat, Cambay, etc., who carry on a very extensive trade by means of caravans with the interior of Asia, even to the borders of Russia and China. These merchants travel much, and the establishments and counting-houses of Indian banians are to be found in almost every commercial town of any note in Asia. In Bengal, the term banian is often applied to the native cashier in the employ of Europeans. Some of the Marathi banians are agriculturists as well as traders, while in the Punjab, the banians are said to belong in part to the degraded Chamar, or leather-working caste. Broadly speaking, the banians are a subdivision of the Vaisya caste, although in Bengal they are ranked with Sudras. In religion they are predominantly Vishnuites, with a large number of Jains in the west of India. From its original association with the merchants and the market-place, the banyan-tree of India received its name.

BANIAN. See BANYAN.

BA'NIM, JOHN (1798-1842). An Irish novelist. He was born at Kilkenny, April 3, 1798. In 1822 John and his older brother Michæl (1796-1874) planned a series of short novels, which should do for Ireland what Scott was doing for Scotland. Three years later appeared the *O'Hara Tales*, followed in 1826 by a second collection. To each series both brothers contributed. These sketches at once attracted notice, and they have maintained a place in literature. They contain many vivid portrayals of character, with the emphasis laid on the dark side of Irish life. If they have not the humor of Maria Edgeworth's *Castle Rackrent*, there is a certain compensation in the poetic feeling of John and in the vigor of Michæl. See, for example, *Father Connell*, by the latter. John afterwards published several longer novels, *The Denounced*; *The Smuggler*; and *The Mayor of Windgap*, besides several dramas, the best-known of which is *Damon and Pythias*. In 1836, general sympathy having been attracted toward his privations, occasioned by disease that prevented all literary exertion, a pension of £150 per annum from the Civil List was awarded him, which was afterwards increased by £40 for the education of his daughter. He died at Windgap Cottage, near Kilkenny, August 13, 1842. Michæl lived on, writing *Clough Fion* (1852), and *Town of the Cascades* (1864). He died at Booterstown, near Dublin. Consult Murray, *Life of John Banim* (London, 1857).

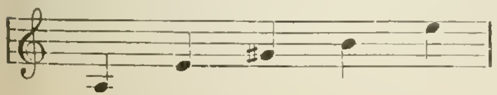
BAN'ISHMENT (for derivation, see BAN). An extreme form of punishment for crime in primitive society, consisting in the exclusion of the criminal from the protection of the law, and his abandonment to his enemies and to strangers. The ban or sentence of outlawry (q.v.) passed upon him not only absolved his family or tribe from all responsibility for him, but also involved the confiscation of his lands and goods. It was usually incurred for a refusal to submit to the jurisdiction of the tribunals or to the ordinary penalties imposed by them. In more advanced society, banishment has sometimes been practiced as a punishment for crime—usually as a commutation for the death penalty—but in a mitigated form not involving outlawry, but enforced absence from the country. In this form, either with or without confiscation of goods, it was not an uncommon form of punishment in the Middle Ages, and in England during the Wars of the Roses; and it is to-day employed in some countries—as in Russia, Turkey, and the Central and South American republics—as a punishment for political offenses. In later English law, the term has been employed to describe the penalty of transportation to the colonies, instituted by the act of Parliament, 39 Eliz. c. 4. Banishment has never in any form been practiced in the United States. See EXILE; PUNISHMENT.

BAN'ISTER, HENRY CHARLES (1831—). An English pianist and composer, born in London. He studied at the Royal Academy of Music, became assistant professor of harmony and composition there in 1851, professor in 1853, and in 1880 was also appointed professor in the Guildhall School of Music. His published works include symphonies in D (1847), in E flat (1848), in A minor (1850), and in A (1853): two quartets for strings (1848; 1850): an *Andante and Rondo* for pianoforte and orchestra (1852); and cantatas, songs, and pianoforte compositions. His *Text-Book of Music* (1872) has been a popular manual for students.

BANJALUKA, bän'yȧ-lōō'kȧ, or **BANIALUKA.** A town of Bosnia, the capital of the district of the same name, situated on the navigable river Verbas, and connected by railway with Agram (Map: Austria, E 4). It contains a number of mosques, and in its vicinity are situated some hot springs. It has a powder-mill, and carries on a trade in grain, animals, and tobacco. The population is about 15,000, including about 7000 Mohammedans, 2000 Catholics, and over 300 Jews. Banjaluka was, in 1878, the scene of an engagement between the Austro-Hungarians and the Bosniaks.

BANJARMASSIN, bän'yär-mäs'sên. A city and district in southeastern Borneo, held by the Dutch since 1787, and incorporated in their possessions since 1860. Watered by the Banjar River and inhabited chiefly by Dyaks, the region produces gold, diamonds, coal, spices, gum, wax, rattan, etc. Forest and jungle in the hilly interior, and rice-fields in the flat valleys and along the sea-coast are the features of the landscape. The town of Banjarmassin, built mostly on piles, has a population of 30,000.

BAN'JO (a corruption, in negro-slave pronunciation, of *banjore, banjer;* cf. *bandore,* Portug. *bandurra,* Russ. *bandura,* all from Gk. πανδοῦρα, *pandoura,* a musical instrument with three strings). An instrument of the guitar kind, with or without frets, played with the fingers. It has a long neck, with a body resembling a tambourine or drum-head, formed of parchment stretched tightly upon a hoop. Banjos have from five to nine strings, usually of catgut, the lowest in pitch, however, being often covered with wire. The melody-string, or thumb-string, is placed outside the lowest bass-string, and is played by the thumb of the right hand; the turning-peg for it is inserted half-way up the neck. The thumb-string from nut to bridge measures 16 inches, the other strings 24. The five-stringed banjo is tuned either



the last note being the thumb-string, or in G, a note lower. The pitch of the banjo is an octave lower than the notation. The banjo is a favorite instrument with the negro. Thomas Jefferson (*Notes on Virginia,* page 47) speaks of it as an instrument "proper to the blacks, which they brought hither from Africa, and which is the original of the guitar, the chords being precisely the four lower chords of the guitar." In Africa the instrument is known under the name *bania.*

BANJUMAS. See BANYUMAS.

BANJUWANGIS, bän'yōō-wäṉ'gēs ('fragrant water'). A seaport town on the eastern coast of Java, the chief town of the district of that name (Map: East Indies, D 6). It has an estimated population of 10,000.

BANK (same as *banc,* bench, elevation). An elevation of the bottom of the sea. When tolerably smooth at the top, banks constitute shallows, shoals, and flats, but when rocky they become reefs, ridges, keys, etc. Pilots and captains of ships are required to be intimately acquainted with the banks along their route; and a chart, if properly prepared, always defines them by means of small dots, if sandy, and small crosses, if rocky. The Newfoundland and the Bahama banks are well-known examples of this kind of sea bottom. In war time, small vessels often escape capture by running into shallows, where larger vessels dare not follow them. The fauna of the banks differs from that of the surrounding deeper waters and often supports important fisheries, as those of the cod and other fish on the Newfoundland banks.

BANKBAN, bäṉk' bän' (properly **BENEDICT BOR**), called also BANCBANUS. A Hungarian military governor of the Thirteenth Century. There is a story, almost certainly legendary, to the effect that, his wife having been wronged by the Queen's brother, he stormed the royal castle and cut the Queen to pieces. On this are founded two dramas, one in Hungarian by Katona (1827), and the other Grillparzer's *Ein treuer Diener seines Herrn* (1830).

BANK, BANK'ING (Fr. *banque,* It. *banca,* from Ger. *Bank,* a bench, table for changing money. Hence, *bankrupt;* It. *banca rotta,* broken bench, as in Florence a bankrupt had his bench broken). The three functions which characterize the banking business are the receipt of deposits, the making of discounts, and the issue of notes. The last named is generally restricted in modern times to institutions chartered by law, though in earlier days, and especially in England, private banks and banking firms issued notes. But as all banks do not embrace all these functions, it is common to speak of banks of deposit and discount, as distinguished from banks of issue. The latter are, as a rule, banks of deposit and discount also; and, as this is the most universal function of banks, it may properly be considered first.

Banks may be tersely described as lenders and borrowers. Their loanable funds consist on the one hand of their own capital, and on the other of the deposits intrusted to them. Their profits arise from the payment to them of interest on loans.

BANKS AS BORROWERS. Receiving as they do deposits from their clients, banks may be spoken of as borrowers. If, as they sometimes do, they pay interest upon deposits, this offsets in part the profits arising from loans. But in many cases they pay no interest upon deposits, the clients of the bank being contented with the greater security in the custody of their funds which the bank offers, and other advantages which arise from the possession of bank accounts. At times these advantages have been so considerable that depositors have been willing to pay the bank for the safe-keeping of their funds. Thus, during the Seventeenth Century, the great Bank of Amsterdam simply received bullion and stored it, issuing receipts for it, which could be transferred from hand to hand, and entitled the holder to get back the gold or silver originally deposited, on the payment of a small premium for withdrawal. Such a bank was merely a warehouse for bullion. It performed a service similar to that of the United States Treasury in the issue of gold and silver certificates. The service was valuable because it substituted the notes of the bank for the extremely varied and uncertain metallic circulation of the period, consisting of the coins of many nations, often worn by use, and clipped by those who derived profit from mutilating the coinage. The bank received them at their bullion value, and thus fixing their real value once and for all, did away with the numberless vexations which arose from the use of such a currency. If we except the United States Treasury, which cannot strictly be called a bank, such banks of deposit only have ceased to exist. The reason for them has disappeared, and the lending of money is always associated in banking with the receiving of it.

Modern banks are banks of 'deposit and discount,' for though all loans made by banks are not in the form of discounts, the word is used in this connection to embrace all its loans. The advantage to society from banking operations consists in centralizing credits. The banker collects the money and wealth which would otherwise lie idle, and brings it into use. Through his agency, wealth which would lie idle and unproductive becomes useful and productive. His particular service is to mass together the small amounts of capital which in themselves are perhaps too trifling to become the basis of a business enterprise. He is the intermediary between those who possess capital and those who employ it. Thus he enlarges the field of business enterprises and intensifies its operations. The bank is the chief organ of credit which plays so large a rôle in the organization of modern industrial society. See CREDIT.

For the depositor the bank acts as paymaster. The depositor pays his debts by orders upon the bank in the form of checks. This not only relieves the depositor of the necessity of keeping in his own possession sums of money larger than he has an immediate use for, and whose safekeeping is a matter of anxiety and concern, but also furnishes him, through the indorsement of the check by payee, a receipt for the money paid out. The banks also act as collectors for their depositors. Only a small part of the deposits in banks consists of actual cash; by far the larger proportion, about nine-tenths, being in checks and other credit instruments. When a check is deposited to the credit of a person, the bank charges itself with the duty of collecting it. If it is drawn upon a distant point, a small charge is made for this service, but in general the cost is borne by the bank and not the depositor. If drawn upon the same bank, the collection consists merely of a transfer upon the books of the bank. If drawn upon another bank, collection may be made directly or through the clearing-house. (See CLEARING-HOUSE.) In either case there is likely to be a set-off, and the collection effected without the transfer of cash. But in addition to collecting checks, the bank collects other debts, such as coupons and negotiable paper.

In addition to these advantages which the depositor obtains from his bank account, he sometimes receives interest upon his deposits. Among the commercial banks of the United States, the practice of paying interest upon deposits is not widespread. Persons who desire interest upon deposits must, as a rule, be content to surrender something of the absolute and immediate control over their funds, which is the characteristic of commercial banking. In such cases, they patronize the savings-banks or the loan and trust companies rather than the national banks. In these institutions, various plans are adopted to restrain the depositor from making sudden calls for any considerable amount of his deposit. Sometimes it is a requirement of previous notice of the intention to withdraw, or again it may be a provision that a certain part of the deposit is to remain untouched, and that interest be paid upon this only. It is clear that the various advantages of banks to the depositor, obvious as they are, cannot be a substitute for the investment of his capital or its employment in productive enterprise. It will therefore be, as a rule, a portion of what is designated as the circulating, rather than the fixed, capital of the nation which will be placed in banks. When banks, however, offer interest upon deposits, under conditions which afford security, they will probably retard the process by which unused capital seeks a definite and profitable employment, and thus secure for the banks a larger line of deposits.

BANKS AS LENDERS. From the services which the bank renders those from whom it borrows, we may turn briefly to the more obvious services, rendered to those to whom it loans. Bank-loans are, in form, time-loans for a definite period of days or months, and call-loans, upon which instant payment may be demanded at will. Either form of loan may be made on the personal credit of the borrower, though this is not considered good banking, and can be safely done only in cases of persons of unexceptionable standing. Loans are made, as a rule, upon mercantile paper and upon collateral. The time of the loan is definitely fixed by the face of the instrument, and the amount loaned is that stated in the note or draft, less the interest upon the same for the unexpired time. Loans upon collateral are either for a definite period of time or on call. As in the latter case the amount of interest cannot be fixed in advance, it is customary to loan a definite sum, and at the expiration of the loan collect also the interest at a rate agreed upon for the duration of the loan. The collateral or security consists of stocks or bonds greater in value than the amount of the loan and probable interest, which are for the time being deposited with the bank. In the event of failure to pay the loan, the bank secures the satisfaction of its claim by the sale of the securities. In the case of discounts of mercantile paper, the bank relies upon the good faith and general property of the several parties to the note or draft, without having a claim against any specific property.

It is clear that in so far as a bank makes its loans from its capital, it can use for that purpose all that is not needed for running expenses. It should be remarked that commercial banks must have a considerable capital of their own, not only for running expenses, but also as a guaranty to depositors. The larger the capital of the bank, the greater the feeling of security among the depositors that, the personal property of the bankers being embarked in the enterprise, caution and prudence will guide its steps, and that in the event of bad investments, the bank will yet be able to meet its obligations as trustee of their funds. But if a bank can employ all its capital, it is obvious that it cannot employ all deposits in making loans, because occasions are always occurring for removing deposits, as well as making them. Business men, for example, day by day, deposit with their bankers the checks or sums of money which they receive in the course of their business; and, on the other hand, day by day, draw out such sums as they require for the payment of purchases of goods, wages, rent, and other expenditure. A bank, therefore, while continually receiving deposits, is continually repaying deposits; and the amount uncalled for is subject to a daily fluctuation. At one period of the year, or in a certain condition of trade, the amount of deposits may be high; at another, low. As it is a principle at the very root of banking that money deposited shall be returned, either on demand, or punctually at the expiration of a stipulated notice, it follows that banks must always have at hand as much of the money deposited with them as may in any emergency be called for. When business is in its ordinary condition, a bank can, after some experience, approximate pretty nearly to the amount of the greatest demand for a return of deposits throughout the year, and provide accordingly. But sometimes the credit of a bank becomes doubted, either from causes peculiar to itself, or on occasions of a panic or general distrust, when all who own money wish to have it in their own possession. In these cases, there is a *run* on the bank for repayment of its deposits, and the amount called for may be far beyond the maximum demanded in ordinary times. If the bank has not retained a sufficient amount of deposits to meet the demand, it is said to *suspend payment*, and, as a general rule, it must wind up its business, the confidence of the public that it will in future restore its deposits on demand being now destroyed. There are two prime rules in safe banking: the one is, that the bank shall lend its deposits only on undoubted and readily reliable securities, however low the profit; and the other that the bank shall retain a sufficient amount of its resources—and this is called the *reserve*—to meet the possible demands of the depositors even in cases of a *run*, although there may be no reason to expect one; for when a run comes, it seldom casts its shadow before. But it is evident that the greater the reserve of a bank, the less the amount of deposits which it can lend out and draw interest for; hence the temptation which banks lie under of imprudently lending out a too great proportion of their deposits; and it is their yielding to this temptation that almost always precipitates the failures of banks.

In the practice of private banking, the amount of the reserve is wholly in the discretion of the banker. Chartered banks are frequently subject to legal provisions which determine not only a minimum reserve, but prescribe how it shall be held. Thus, in the national-banking system of the United States, the law requires a minimum reserve of 25 per cent. of the amount of the deposits in large cities named in the law, and 15 per cent. of the deposits in other places. In three of the principal cities, namely, New York, Chicago, and Saint Louis, which are designated as central reserve cities, the whole amount of the reserve must be held in lawful money of the United States. In the remaining cities, one-half of the reserve may consist of deposits in the three central reserve cities named; but at least one-half must be held in lawful money in the bank. In other places, two-fifths of the legal reserve only need be held in the bank in lawful money, and the remainder may be deposited in any of the reserve cities. In practice, the reserve held by the national banks is considerably in excess of the legal requirement.

In England, the practice of banks is somewhat similar. The reserve of the banking department of the Bank of England is always in coin or in notes, against which there is coin lying in what is called the issue department of the bank. Other banks generally hold a portion of their reserve either in Government bonds, which can be readily sold in case of necessity, or as a deposit in the Bank of England. As the Bank of England is the channel through which, directly or indirectly, payments are made and moneys received, by other banks, it is more convenient for them to have their reserve lying as a deposit in it than lying as gold within their own vaults. In the case of a demand on their reserve, the banks will draw out their deposits, in notes, or, if gold be in demand, in gold, from the Bank of England. Whether, therefore, the reserve of a bank is invested in Government securities or is deposited in the Bank of England, or is in Bank of England notes, it is from the coin in that bank that the gold comes in the case of a run. It is apparent from this that it is essential to the stability of all banks in that country, so long as they themselves do not keep a sufficient reserve of coin in their coffers, that the Bank of England shall always be possessed of coin, and ever be able, on demand, to pay its depositors in gold, or to give gold in exchange for all its notes that may be presented to it.

Banks of Issue. We have thus far discussed only banks of deposit and discount, and it is now time to consider the special characteristics of banks of issue. Banks of deposit, as has been mentioned, make loans from their capital and deposits. If from capital, the banker has no greater profit by the transaction than if he had lent out his money in any other way, equally safe, and involving the same amount of trouble. If from deposits, the interest he receives, so far as it exceeds the interest, if any, paid to the depositors, and a ratable proportion of the expense of carrying on the business of the bank, is pure gain to him. But a banker may give the loan from his own notes, and in that case his gain is still greater. A bank-note is simply a written promise, by the bank issuing it, to pay to the bearer, on demand, a sum of money—that is, lawful money. The borrower would not accept a loan from a bank in its own notes, unless he believed that it could redeem its promise of paying in coin, and that the public were of the same opinion; for the moment that a suspicion arises that the promise will not be made good, the note will cease to pass from hand to hand as coin, or to perform all the functions that coin performs. But when the loan is accepted in a bank's own notes, it is evident that the interest which the bank draws for the loan of its promises to pay is pure profit, except the proportion—as in the other cases—of the expense of carrying on its business, and the expense of the paper and printing of the notes, and any special taxes resting upon such issues. In other words, a bank which can get people to pay to it interest for the loan of its promises to pay, draws the same income—barring the comparatively trifling expense of manufacturing the written promises—as a bank does which has to provide itself with gold for making its loans. The motive which a bank has to extend its issues on loans is therefore apparent, so long, of course, as it is not compulsory on it to retain unemployed in its coffers as much in gold as it issues in notes.

But it does not follow that when a bank makes a loan in its own notes for a definite period, it will really obtain the benefit of the whole of the interest on it for that period: for the borrower does not apply for the notes that he may keep them lying idle, but that he may pay them out in making a purchase, or in liquidating a debt: and this, most commonly, on the very day he receives them. If the person to whom the notes are thus paid by the borrower has himself no purchase to pay for, or no payment to make, he may, the moment he gets them, return them to the bank that issued them, to lie there on deposit. If the bank pays interest on deposits, as banks often do, then out of the interest drawn by it on the original loan, it will have to pay interest to the depositor of the notes; in other words, the loan is no longer a loan of its notes, but a loan from its deposits. Or, the person receiving the notes from the borrower, may immediately present them to the issuing bank for coin, instead of depositing them. Here, too, therefore, the loan that was made in notes is now converted into a loan of coin that was in reserve from previous deposits, or that was part of the bank's own capital; in which cases, the bank obtains no advantage whatever in having made the loan originally in its notes. It might equally well, so far as profit is concerned, have originally made it in gold from its reserve of deposits or capital. Notes generally find their way back to the bank that issued them through other banks, into which they have been paid as deposits, or for the liquidation of debts due to them. These banks suffer the loss of profit or interest on the amount of the notes thus received by them so long as they keep them; they therefore immediately present them to the issuing bank for gold, to replenish their own reserves, or to lend out.

It will now be apparent to the reader that there are two checks which, under such a system, keep a bank from issuing notes to any extent it pleases. In the first place, there must be a demand for its notes by borrowers. It is only to people in good credit, and likely to make a profitable use of them, that a bank will lend its notes, and such people will not take an increase of loans unless trade is increasing, and new opportunities be presenting themselves for profitably employing the notes borrowed. True, banks, when imprudently conducted, or when deceived in the character of their customers, frequently lend their notes to reckless persons, who overtrade them, and become bankrupt. But banks commit this error, when they do commit it, to a far greater extent by loans of their deposits and capital than by loans of their notes. In the second place, the immediate return of the notes, chiefly through other banks for gold, or for other portions of the reserve of the issuing bank, is a check to its issuing more notes than it has a reserve to meet. This return of notes through banks is called the *exchange* of notes—the notes issued by a bank being returned to it in exchange for the notes held by it of another bank.

Besides issuing its notes in loans, a bank may issue them in repayment of deposits. In this case, there is the same profit to the bank as in the other case. The bank gets the profit which it makes on the money which was originally deposited or lodged with it, without having to pay interest to the persons who made the deposit or lodgment; the deposit, or money lodged, having now been repaid in its notes. But here, too, these notes are equally liable to be returned to the issuer as when they are issued on loans.

Of all the notes issued, in whatever way, by banks, a certain amount is not returned to them, but is kept in circulation, being what is required by the necessities of the public for use as money, passing from hand to hand. It is of course on this portion that the banks make their profit; and, in consequence of this profit, they are able to afford banking facilities to the public more cheaply than they could otherwise do. The profit is just the interest on the notes in circulation—less the expense of manufacturing the notes, a ratable proportion of the expenses of conducting the banks, and the loss of interest or profit on an unemployed reserve kept from prudence, or by the requirement of law, to meet a return of notes. The interest on the volume of bank-notes in circulation is paid by the persons who originally borrowed these notes from the banks, and who have not repaid them; or if the banks have repaid deposits with the notes, the interest is paid by those to whom they lent what was originally these deposits.

In the foregoing discussion of the nature of bank-note issues, it has seemed best to proceed upon the assumption that the issue of notes, and the conditions of the issue, such as the amount of the reserve, lay wholly in the discretion of the banker. This is the so-called 'free'-banking system, in which the value of the bank-note depends upon its instant redemption in coin, where the whole organization of the system is such that the bank will, in fact, be called upon to redeem its notes frequently. But the issue of bank-notes in modern States is not thus left wholly to the discretion of the banker. In the first place, the issue of such notes is not universally permitted, but is restricted, as a rule, to chartered institutions. In these again, the issue is frequently subject to legal restrictions, affecting, for instance, the amount of the reserve. Two general types of bank-notes may be said to exist: (1) those issued upon the general assets of the banks being those contemplated in the foregoing discussion, and (2) those issued upon the deposit of certain securities. In principle, the latter class, of which, perhaps, the most conspicuous instance is the issue of bank-notes under the National Bank Act of the United States, departs widely from the theoretical ideal of a bank-note. In the second case, the value of the note depends upon the securities behind it, and not upon its frequent redemption. Indeed, it may be said that the object of the law is to make the bank-note so safe that it will not be presented for redemption, but continue to circulate as money, and this end is fully attained.

Banking in the United States. The earliest use of the term 'bank' in the American Colonies was to designate an issue of paper money, and it may be said that, in the history of banking in the United States, banks of issue play a more important part than elsewhere. All the banks mentioned in Colonial history were loan banks, and not deposit banks. The funds they loaned were issues of notes. Between the issues thus loaned by banks under authority of the Government, and the issues of the Colonial governments, no clear distinction was drawn, and all such issues were frequently designated as banks. (See Money.) This is not to be wondered at when we recall the fact that the issues of the Colonial governments, notably in Pennsylvania, were loaned to individuals, on mortgages, plate, and other securities. The collapse of the Continental paper currency in 1781, led to the chartering by Congress on the last day of the year of the Bank of North America. In addition to the usual business of a bank, this institution was designed to furnish through its notes a circulating medium for the country. The Bank of New York, and that of Massachusetts, at Boston, were chartered in the year 1784. But the erection of these institutions did not check the issue of paper money by the several States, which, however, ceased with the adoption of the Federal Constitution, which expressly forbade such issues.

Among the earliest acts of the new Congress was one chartering the first Bank of the United States, February 25, 1791. The charter was for twenty years. The authorized capital was $10,000,000, of which Congress took $2,000,000. The capital was subscribed partly in coin and partly in Government securities. The notes issued by the bank were receivable by the Government for all debts due to it. The charter of this bank did not prevent the rise of a considerable number of banks in the States, which also issued notes. But by reason of its larger capital, and its several branches in different parts of the country, the Bank of the United States dominated the entire banking system and regulated the issues of the State banks. It could and did refuse to receive as deposits, or in payments, the notes of banks which were not sound, and by sending the notes received from one branch to another would insure the presentation of the notes of other banks for redemption. In the early part of the century the Government sold its stock in the bank, and when, in 1811, the charter expired, the Government had no direct interest in its renewal. The renewal of the charter was opposed by the State banks, and the effort to secure it failed. The bank, thereupon, wound up its affairs. The absence of the restraining influence of the Bank of the United States soon made itself felt. State banks multiplied; from 90 in 1810, they grew to 150 in 1814, with note issues of $62,000,000. The war with England brought about a general suspension of specie payments, and a very disordered state of the bank-note circulation, the only currency of the country. The 'old regulator' was seriously missed, and, on April 3, 1816, Congress chartered the second United States Bank at Philadelphia, with power to establish branches. Its capital was $35,000,000, of which the Federal Government took $7,000,000; the bank, with its branches, was made the official depository of Government money; its bills were legal tender, and it was the agent for negotiating Federal and State loans. This compelled the State banks to resume specie payments, and business again moved forward steadily. State banks, however, grew in number rapidly. In 1816 there were 246, with $90,000,000 capital. In 1830, when the rechartering of the United States Bank was proposed, there were 330 State banks, with $145,000,000 capital. President Jackson, in his message, December, 1829, expressed his opposition to the United States Bank, and his expected veto of the bill to renew the charter came in July, 1832. The next step was to remove the deposits of public money from the bank. This took the form of an order to cease deposits in the United States Bank and to draw out the balance in payments. This could be done only by order of the Secretary of the Treasury, and as that officer refused to conform to the President's wishes, he was summarily removed, and a more tractable man was appointed in his place. The old bank, which had more than once saved the credit of the nation, was crippled and went down. In the wind-up it was found that its whole capital was lost, though it managed to pay its debts. Its last operations were under a charter from the State of Pennsylvania.

The refusal to continue the National Bank gave full scope to State institutions, and they grew with mushroom rapidity. In 1837 there were 634 of them, with a capital of $291,000,000, of which $149,000,000 were in circulating notes, and $127,000,000 in deposits. The loans and discounts amounted to $525,000,000. The inevitable crash was hastened by an enormous crop of cotton in 1836, a consequent decline in prices, and the depreciation of the credit of cotton-dealers and their backers. The tumble began in 1837, and by the first of June there was an entire suspension of specie payments; values fell from dollars to shillings, all business was deranged, millions of people were reduced from comparative ease to sharp poverty, and a period of wretchedness began which continued nearly five years. However, Congress passed a general bankruptcy law, the States assisted, by limitation and other laws, and by 1843-44 the country had nearly recovered. The banks had many trials; some resumed only to suspend again, and many went into liquidation. Congress passed the Independent Treasury Act, and thereafter the Federal Government had no direct concern in banking until the Civil War broke out. The old United States Bank had its final downfall in the crash of 1837. That crisis taught wisdom to the State banks, and a general retrenchment was the consequence. Between 1838 and 1842 the number of banks was reduced from 675 to 577; capital from $317,000,000 to $229,000,000; circulation from $116,000,000 to $59,000,000; and discounts from $486,000,000 to $254,000,000. Further security was demanded by the public, and among the new measures were the Suffolk Bank plan in Massachusetts, and the New York safety-fund system. The Suffolk Bank plan was merely an arrangement whereby that bank was made the channel through which all notes of New England banks that found their way to Boston, as most of them naturally did, were at once forwarded to the issuers for redemption. The result was that all solid bankers found it for their interest to deposit with the Suffolk a redemption fund, as that insured the acceptance of their notes.

The New York safety-fund system, which is the cardinal principle of the present national banking plan, required each bank to deposit, with the banking department of the State, securities consisting of Federal or State stocks, or bonds and mortgages, which, in case of the failure of the bank, were sold, and the proceeds applied to the liquidation of its debts. In 1857 there was another crash, followed by a general suspension of specie payments; but the depression did not long continue.

One of the serious evils, avoided to a great extent by the issue of greenbacks and national bank currency, was counterfeited or altered bills. When almost every bank had its own plates for six or more denominations of notes, the country was flooded with counterfeits and alterations, and no business man ventured to accept a bank-note not well known to him without previous comparison with counterfeit detectors, weekly volumes giving description of counterfeits and spurious notes. In 1862 there were counterfeits on the notes of 253 banks, besides 1861 bills imitated, and 1685 entirely spurious notes. On the best notes there was a discount in the business centres of from 1 to 10 or even 15 per cent.; and exchange was more variable than the weather. The 'wild-cat' and 'red-dog' banks of Michigan and other Western States were notoriously unsafe. A dozen of them would club together to make a show for one only, when the examiner came along, and the same specie would be an hour in advance of him all along his route. The 'red-dog' bank was so called because of its movable nature, and of the color stamped on its notes. Established in one place on Monday, the 'banker' might pack his carpet-bag at night, and on Tuesday open his bank 50 miles away; in which case he stamped in red ink on the face of his notes the name of the place in which the 'banking-house' was last established.

The Civil War (1861-65) made large issues of credit necessary, and among the earliest financial proposals was one to enlist the interest of banks in the national credit by permitting them to organize under a national law and issue notes on the basis of bonds purchased by them and deposited with an officer of the Government. It was, however, some time before these proposals took the form of law in February, 1863. In the meantime, Congress had flooded the nation with paper money issued directly by the Government. The banking law of February 25, 1863, created a currency bureau in the Treasury Department, at the head of which is the Comptroller of the Currency, who has power to authorize banking by associations of not less than five persons, and a minimum capital (unless in very small places) of $100,000, one-half to be paid at once, and the remainder in six months. Before commencing business, the association must transfer to the Treasury of the United States interest-bearing bonds of the National Government to the amount of one-third the capital; whereupon they may receive circulating notes, registered and countersigned, equal to 90 per cent. of the market value of the stocks deposited, but not beyond the amount of their par value. The entire amount of currency to be issued was limited to $300,000,000, one-half to be apportioned among the States according to their representative population, and the other half with regard to the existing banking capital, resources, and business of the several States. The system was slow in getting into operation, and the aid rendered the Government by furnishing a market for its bonds was, after all, slight. In January, 1865, there were only 683 banks that had organized under the national law. To hasten the process, a law of March 3, 1865, imposed a tax of ten per cent. on the notes of State banks, to go into effect August 1, 1866. Under the stimulus of this law, the reorganization proceeded rapidly, and in October, 1866, the number of national banks had reached 1644. The subsequent development of the national banking system is briefly shown in the following exhibit:

DATE	Number of Banks	MILLION DOLLARS				
		Capital, Surplus, and Undivided Profits	Individual Deposits	Circulation	Loans and Discounts	U. S. Bonds to Secure Circulation
Jan. 22, 1870..	1,615	450	546	295	689	339
Mar. 1, 1875...	2,029	679	648	325	956	381
Feb. 21, 1880..	2,061	614	849	321	974	362
Mar. 10, 1885..	2,671	730	997	274	1,232	313
Feb. 28, 1890..	3,383	917	1,480	124	1,845	143
Mar. 5, 1895...	3,728	992	1,668	170	1,965	196
Feb. 13, 1900..	3,604	977	2,482	205	2,481	236
Sept. 30, 1901.	4,221	1,086	2,938	324	3,018	329

National Banks. Of the national banking system, it may be said that the Civil War presented to Congress as its first duty the invention of some plan for repressing the heterogeneous banking system and providing a system of a homogeneous and absolutely safe character; one that would be truly national, operating alike in every part of the United States. The necessities of the Government inspired the new order, but the old was rapidly failing to meet the wants of the people. The new, therefore, may be said to have grown out of the necessities of business as well as the straits of the nation. The new system preserved all the advantages of the old, and added many new ones. It gave absolute protection to the holders of the national bank-notes, as Government bonds were deposited with the United States Treasurer in ten per cent. excess of their issue for the security of their redemption. It provided security of a uniform and almost absolute character for the deposits, making the stockholder liable, in an equal amount of his stock interest, for the ultimate payment of the deposits. It provided for a uniform bank-note of equal value in every part of the country, so engraved and issued, that security against counterfeits was far better attained than ever before. It provided for a system of redemption which made exchange merely nominal, and gave to national bank-notes, issued in most distant places, a uniform value in all the great financial centres of the country. It provided a system of published reports over the sworn signatures of the executive officers of the banks, and a uniform system of examination under the direction of the Comptroller of the Currency.

The national banks were required to pay to the revenues of the General Government as follows: (1) One-half of one per cent., semi-annually, on the circulation allowed by law. (2) One-quarter of one per cent., semi-annually, on the average deposits for the half year. (3) One-quarter of one per cent., semi-annually, on capital not in Government bonds. Their stockholders are subject to local taxation on the market value of their stock as personal property. Each bank must keep with the Treasurer of the United States, in legal-tender notes, for the redemption of its bills, 5 per cent. of the amount of its circulation.

ABSTRACT OF REPORTS OF EARNINGS AND DIVIDENDS OF NATIONAL BANKS IN THE UNITED STATES FROM MARCH 1, 1901, TO SEPTEMBER 1, 1901

GEOGRAPHICAL DIVISIONS	No. of Banks	Capital Stock	Surplus	Dividends	Net Earnings	RATIOS Dividends to Capital Per cent.	RATIOS Dividends to Capital and Surpl's Per cent.	RATIOS Earnings to Capital and Surpl's Per cent.
New England States..........	557	$135,820,820	$182,479,044	$4,177,397	$ 5,141,305	2.82	2.29	3.08
East. States, N.Y. to D.C....	1,055	211,208,935	135,474,465	8,997,682	16,175,874	4.67	2.60	4.26
Southern States................	654	71,133,835	24,250,881	2,806,904	6,032,882	6.32	2.94	3.75
Middle States, O. to Mo....	1,198	168,083,100	52,919,905	6,816,907	10,351,077	4.68	3.08	4.06
Western States..................	439	32,769,390	6,274,379	1,608,913	2,122,816	5.44	4.12	4.91
Pacific States....................	127	20,027,000	5,854,450	887,020	1,481,466	5.72	3.39	4.38
United States....................	4,030	$639,043,080	$407,253,124	$25,294,823	$41,305,420	4.54	2.73	3.96

TABLE SHOWING CAPITAL OF BANKS AND BONDS HELD FOR CIRCULATION SEPTEMBER 5, 1900

	LESS THAN $150,000		$150,000 AND OVER		BONDS HELD BY ALL BANKS			
	No. of Banks	Capital	No. of Banks	Capital	No. of Banks	Bonds Held	Required Number Held	Excess
Central Reserve Cities....................	....	....	64	$ 93,500,000	64	$ 43,400,000	$ 3,200,000	$ 40,200,000
Reserve Cities................................	9	$ 950,000	258	149,600,000	267	53,800,000	13,200,000	40,600,000
Country Banks...............................	2,991	222,310,000	550	164,000,000	3,540	197,700,000	83,100,000	114,600,000
Total..	3,000	$223,260,000	872	$407,100,000	3,871	$294,900,000	$99,500,000	$195,400,000

TABLE RELATING TO BANKS OTHER THAN NATIONAL, ON OR ABOUT JUNE 30, 1901

GEOGRAPHICAL DIVISIONS	STATE BANKS			TRUST COMPANIES			PRIVATE BANKS			SAVINGS-BANKS		
	No. of Banks	Capital milli'ns	Deposits milli'ns	No. of Banks	Capital milli'ns	Deposits milli'ns	No. of Banks	Capital milli'ns	Deposits milli'ns	No. of B'nks	Capital milli'ns	Savi'gs Deposits milli'ns
New England States	22	3.3	9.5	77	18.9	187.0	....	....	....	466	....	963.4
Eastern States.........	352	41.6	468.2	217	111.5	1,075.2	51	2.1	10.4	192	....	1,231.5
Southern States.......	1,129	51.8	181.5	4	1.6	0.4	65	1.7	6.7	32	1.3	12.0
Middle States...........	1,837	97.3	675.7	36	5.4	8.5	736	13.1	89.1	256	9.4	73.6
Western States.........	1,341	21.8	112.3	....	....	....	31	0.7	4.6	....	....	....
Pacific States...........	289	35.9	142.3	....	....	....	33	1.3	7.0	56	7.8	170.8
Islands......................	13	3.3	21.0	....	....	....	1	0.5	0.9	....	....	....
United States..........	4,983	255.0	1,610.5	334	137.4	1,271.1	917	19.4	118.7	1,002	18.5	2,451.3

Without any wide departure from the principles laid down in the original act, the laws governing national banks have, from time to time, been considerably modified in details. Thus the restriction upon the aggregate amount of bank-note issues has long since (1875) been removed. The charters of the banks were to lapse in twenty years, but in 1882 Congress authorized the recharter of the banks for terms of equal length. The currency law of March 14, 1900, made a number of important changes in the conditions of the issue of national bank-notes. It permits the issue of notes to the par value of the bonds deposited, instead of 90 per cent. of the par value, subject only to the restriction that in case the market value of the bonds should fall below the par value of the same, additional deposits of bonds or of lawful money might be required to maintain the security for the notes issued. The law provided for the conversion of several series of outstanding bonds into 2 per cent. gold bonds, payable thirty years after date. To effect this change it offered to the banks a special inducement in reducing the tax upon the circulation, so far as issued upon the new bonds, from one per cent. to one-half of one per cent. The act, moreover, favors the extension of the national banking system to small communities, inasmuch as it permits the erection of banks with a capital of $50,000 in places whose population does not exceed 6000 inhabitants, and of banks with a capital of $25,000 in places where the population is less than 3000. The object of these changes was to extend the system and render the issue of notes more attractive. How far it has accomplished this end is sufficiently evident from the statistical exhibit already made.

National banks are the only banks of issue in the United States. But the States have chartered several forms of deposit banks in large number, while private bankers are also numerous. The business operations of State banks differ from those of national banking associations only in so far as they lack the feature of note issues. On the other hand, the loan and trust companies present some variations. In so far as they do a banking business, they differ from the State and national banks in paying interest on deposits. They are, moreover, generally restrained by law from discounting mercantile paper, and their loans are made upon collateral. The peculiar features of savings-banks call for no extended notice here. Both their deposits and their investments are, as a rule, of a more permanent character than those of other banks. The relative strength of the several forms of banks and other points which summarize banking operations in the United States are given in the accompanying statements from the last *Report* of the Comptroller of the Currency, for the fiscal year ending June 30, 1900.

Banking in England. In the banking system of England, the central figure is the great Bank of England. This bank, the most important in the world, was projected by William Paterson (q.v.), and was incorporated July 27, 1694. It was constituted as a joint-stock association, with a capital of £1,200,000. In return for the loan of its entire capital to the Government, it received the right to issue notes and a monopoly of corporate banking in England. It was not until early in the Nineteenth Century that this monopoly was broken down. At its very outset, the Bank of England was a servant of the Government; and in a lesser or greater degree, it has enjoyed this character through all the stages of its subsequent history. At first the charter of the Bank was for eleven years only; but in consequence of the great services of the institution to the Government, its charter has been at various times renewed. The last renewal was in 1844, and the charter of that year still subsists, its terms being subject to modification or revocation by the legislature at pleasure. By the act or charter of 1844, the bank was divided into two departments—the *issue* and the *banking*. What led to the division was this: it was supposed that, when a foreign drain of gold should set in, it would, if the currency or circulation in the country had been purely metallic, have produced a contraction of the circulation, and a consequent fall of prices, and, as an ultimate result, the cessation of the drain. It was further supposed that banks could issue their notes to any extent they pleased when their excessive issues increased the currency, and therefore increased prices, which in their turn led to foreign drains; and that, on the occasions of these drains, the continued issues prevented the natural and desirable contraction of the circulation, and aggravated the commercial convulsions occurring at such periods. The object of the act of 1844 was to prevent issues of notes beyond a certain amount, unless against an equal amount of gold held by the issuing bank, so that the mixed currency of notes and coin might thus expand and contract like a self-acting metallic currency. Experience, however, has shown that, when these foreign drains occur, the gold exported is taken chiefly from the reserves in the Bank of England, being withdrawals of deposits or loans by the Bank; and that the amount of notes in the hands of the public has not been affected by the legislation of 1844. In practice, whenever there are signs of a foreign drain, and the reserve of the Bank is diminishing, the Bank counteracts the tendency to a drain by raising the rate of discount and restricting its loans; the purchasing power of the public is thereby limited, and prices kept down; and, at the same time, gold is attracted to England for investment. The circulation is in reality not interfered with. It was also intended by the act of 1844 to add to the security of bank-notes by insuring a supply of gold to meet the payment of them at all times. But the solvency of the Bank of England is undoubted; its notes would at any time be taken as gold; and this effect of the act of 1844, and the supplementary act of 1845, has in the case of the notes of other banks been hitherto inappreciable.

In the *issue* department of the Bank of England, its sole business is to give out notes to the public. Before the separation of the departments, the Government was indebted to the Bank £11,015,100. This sum was declared to be now a debt due to the issue department, and for the issues of notes to that amount, no gold need be held by it. This was just the same thing as if the Bank had originally lent £11,015,100 of its notes to Government, and these notes had found their way into circulation. The Bank was also allowed to issue notes on securities without holding gold. The amount of notes which may thus be issued, without gold being in reserve against it, is £17,775,000. All notes issued above that amount can be issued only in exchange for gold. At the passing of the act in 1844, the limit of notes to be issued against the Government debt and securities was fixed at £14,000,000—past experience having shown that there was not the least risk of there being at any time less than that amount of Bank of England notes in the hands of the public. The subsequent addition of £3,775,000 arose from the fact that when other banks of issue then in existence ceased to issue, notes equal to two-thirds of their circulation were by the terms of the act to be issued by the Bank of England. The profit the Bank derives from its issue department is the interest received on the Government debt and securities, less the amount paid as taxation and the expenses of the department. The Bank also makes a profit upon bullion and foreign coin. These are brought to the Bank for notes; they are worth £3 17s. 10½d. per ounce; but the Bank is obliged by its charter to purchase them at £3 17s. 9d. The holders prefer taking this price to having their bullion and foreign coin coined, free of charge, at the public mint, as the delay in the coining is equal to a loss of interest of 1½d. per ounce. The amount of notes in the hands of the public averages about £25,000,000; but the amount issued by the *issue* department is greater. The difference is the amount lying in the *banking* department, and represents the reserve of gold of that department; that is to say, the banking department retains only a half or three-fourths of a million of coin, and transfers the bulk of its reserve to the issue department in exchange for notes. The reserve of the banking department is regarded as gold, though it consists of notes issued by the other department.

Viewed in its *banking* department, the Bank differs from other banks in having the management of the public debt, and paying the dividends on it; in holding the deposits belonging to the Government, and making advances to it when necessary; in aiding in the collection of the public revenue, and in being the bank of other banks. For the management of the public debt, the Bank receives about £247,000, against which there has to be set £124,000 of charges. The remaining profits of the Bank are derived from its use of its deposits, on which it allows no interest, and of its own capital. The capital was originally £1,200,000; in 1816 it reached £14,553,000—the present amount. There is besides a reserve of about £3,200,000. In December, 1901, the public deposits were £10,493,177, and the private were £39,460,027; the maximum of deposits, public and private, is about £50,000,000.

In 1797, the Bank, being on the verge of bankruptcy, was ordered by the Government to suspend the redemption of its notes in coin, and the notes became the main currency of the nation, until the resumption of specie payments in 1821. The notes during this interval not having been convertible into coin on demand, there was no check upon the Bank in the amount of its issues; and the currency became depreciated. It is, however, said that the value of gold at the time was enhanced owing to absorption by hoarding and by military-chests, and that the depreciation was more apparent than real. The export of gold following on a rise of prices occasioned by an issue of bank or Government notes is unlimited, except by exhaustion, if these notes are not payable in coin on demand, and are issued without any check from without or self-imposed. But as prices estimated in these notes rise, the price of bullion, like other commodities, rises too, and the price of coin which can be converted into bullion, or be used abroad at its previous purchasing power, rises also. Since 1821 the Bank has more than once been on the verge of a suspension of payments, owing to foreign drains of gold. The separation of the Bank into two departments is regarded by many as having a tendency to produce a suspension in times of panic, when the reserve is reduced by withdrawals to supply a foreign drain, or to meet an internal run. Before the separation, the Bank, in the case of withdrawals of gold, had the whole amount of gold within its vaults to meet them; but now it loses the command of all the gold in the issue department. It cannot get that gold unless in exchange for notes, but, its reserve being reduced or exhausted, it has none to spare. The restriction of credit consequent upon the approach to an exhaustion of the reserve of the banking department, is so great that the fear of it occasions a panic; and in 1847, 1857, and 1866, on the possible suspension of payments by the banking department, owing to a reduction of its reserve, being apparent, the Government of the day took the responsibility of authorizing the Bank to lend additional notes, not represented by gold, which was an indirect way of getting at the gold in the issue department, where the object of the borrowers was to obtain gold. The Bank of England is situated in the centre of London; but it has two branches in the metropolis and nine branches in the provinces.

Other Banks in England and Wales. While the Bank of England long held a monopoly of banking in London, it could not prevent the rise of banks throughout the provinces. In the first instance these banks were merely private partnerships, and the number of partners could not exceed six. These country banks issued notes, and were without any Government supervision or control. After the panic of 1825, a law was passed permitting the country banks outside of a radius of 65 miles from London to organize as joint-stock companies, with their right to issue notes unimpaired. The Bank of England strenuously but ineffectively opposed the extension of the joint-stock principle, which had been conceded in the provinces, to the London banks. In 1833 an act of Parliament authorized the establishment of such banks in London, though it refused to give them the note-issuing privilege. When the Bank of England was rechartered in 1844, all joint-stock banks and private banks were restrained from issuing further notes, though they were authorized to maintain the circulation then outstanding, calculated on the average of the twelve weeks prior to April 27, 1844. At the time the Bank Act went into effect, the outstanding issues other than Bank of England notes were £5,153,417 for 207 private banks, and £3,478,230 for 72 joint-stock banks. In the course of time the number of issuing banks decreased, so that in 1902 there remained only 27 private banks and 24 joint-stock banks, having note issues to the extent of £2,462,662.

Banks in Scotland. The earliest banking institution in North Britain was the Bank of Scotland, instituted by a charter of incorporation from the Scottish Parliament in 1695. The original capital was £1,200,000 Scots, or £100,000 sterling. In 1774 the amount of stock was extended to £200,000 sterling; now it is £1,250,000 sterling. In 1727 a new and similar establishment was constituted under the title of the Royal Bank of Scotland, whose advanced capital is now £2,000,000. In 1746 another association was formed, and incorporated by royal charter, with the title of the British Linen Company. From £100,000, its capital has increased to £1,000,000. Besides those three banks, there are in Scotland eight other joint-stock banks, but no private banks.

In consequence of allowing interest on deposits, the banks in Scotland may be said to hold the whole capital of the country, minus only the money passing from hand to hand. This widespread system of depositing is greatly aided by the establishment of branches from the parent banks, and these branches are found in every small town in the kingdom. The entire number of branch banks in Scotland is over one thousand. At these branch banks the agent (who is usually a responsible person in business) discounts bills within certain limits, issues letters of credit, and pays out notes, and also gives cash on demand for them; though, strictly, the notes of a bank are payable only on demand at the head office. By a strict system of supervision, Scottish branch-banks are usually well conducted, and are of great service in every department of trade.

The banks in Scotland, like the banks in Ireland, but unlike the provincial banks in England, are allowed to issue notes beyond their fixed issues, on holding gold equal in amount to the extra issue. But as the gold thus retained is, like the other gold in reserve, liable for all deposits, as well as for the whole circulation of a bank if it should fail, the security of the establishment is increased only in a small degree by this arrangement, which, apart from the loss of profit to the bank on the gold unemployed, is attended with inconvenience at those seasons when the circulation is extended. In Scotland, and Ireland also, banks can issue one-pound notes; the English banks are not permitted to circulate notes of less value than £5.

Besides employing money in discounting bills, the Scottish banks grant loans of fluctuating amount, called *cash-accounts* or *cash-credits*. By a cash-account is signified a process whereby an individual is entitled to draw out sums as required, to a stipulated amount, and on an implied condition to make deposits at his convenience toward the liquidation of the same. On entering into this arrangement, he finds security to the bank that he will repay to the bank, whenever called on, the balance of sums drawn out, less those paid in, with the interest that may be due. These accounts are balanced yearly, like current or deposit accounts. The only difference between the latter and a cash-account on the face of them is, that if the credit allowed on the cash-account is being made use of, the balance is in favor of the bank; whereas, on the other kind of accounts, the balance is in favor of the bank's customer.

BANKS IN IRELAND. There are nine joint-stock banks, having 454 branches and sub-branches. Their authorized issue is £6,354,404, of which £3,738,428 is that of the Bank of Ireland. It is a national bank, lending £2,630,769 of its capital to the Government. It was established in 1783, with privileges resembling those of the Bank of England. Its capital is £2,769,230, and its reserve £1,034,000. The capitals of the other banks vary from £142,766 to £1,500,000, and the total capital of the joint-stock banks in Ireland is £6,901,966. Six are banks of issue. Interest is allowed on money deposited for a stated period, but not on money at call, or as a rule on current accounts.

The following table gives some of the important features of the assets and liabilities of banks doing business in the United Kingdom for the date June, 1900:

LOCATION	No. of Banks	No. of Branches	Capital Reserve and Undivided Profits	Circulation	Deposits and Current Accounts	Loans and Discounts	Cash Money at Call and Sh't Notice
Bank of England	1	11	£ 17,800,000	£30,200,000	£ 48,500,000	£ 30,500,000	£ 33,600,000
England and Wales Joint-Stock Banks	82	3,824	80,400,000	900,000	571,700,000	386,800,000	136,100,000
England and Wales Private Banks	21	....	7,100,000	200,000	42,100,000	23,500,000	10,500,000
Isle of Man Joint-Stock Banks	3	12	200,000	100,000	1,500,000	800,000	200,000
Scotland Joint-Stock Banks	11	1,077	17,100,000	7,900,000	103,700,000	70,500,000	25,600,000
Ireland Joint-Stock Banks	9	559	11,400,000	6,400,000	47,700,000	36,600,000	9,900,000
Total	127	5,483	£134,000,000	£45,700,000	£815,200,000	£548,700,000	£215,900,000
Colonial Joint-Stock Banks with London offices	30	1,652	46,500,000	9,300,000	167,500,000	167,000,000	54,000,000
Foreign Joint-Stock Banks with London offices	24	312	42,600,000	3,500,000	115,600,000	156,900,000	33,800,000
Grand Total	181	7,447	£223,100,000	£58,500,000	£1,098,300,000	£872,600,000	£303,700,000

CONTINENTAL BANKS. On the Continent of Europe there are both private and State banks. The Bank of France stands second in repute only to the Bank of England. It was founded in 1800, and in 1806 was placed upon an enduring basis. Its original capital was 45,000,000 francs, which was increased in 1806 to 90,000,000 francs, and later reduced to 67,900,000 francs, with a reserve of 12,980,750 francs. It has the sole right to issue paper money in France, and enjoys a high degree of public confidence, which it is so anxious to retain, that in 1888, when dangerous counterfeits of its 1000-franc notes were put into circulation, it preferred to redeem them rather than, by refusing payment, to impair the general readiness to receive its own genuine paper. The Bank of France has often rendered important services to the French Government in furnishing large and promptly given loans. In November, 1890, during the crisis in the London money-market owing to the embarrassment of the firm of Baring Brothers, the Bank of France was able to relieve the pressure on the Bank of England by a large advance of gold. It issues notes of 50, 100, 500, and 1000 francs, and, besides carrying on a general banking business, takes charge of valuables, such as plate, jewels, and title-deeds, at a charge of one-eighth per cent. of the value of the deposit for each six months. It has various branches or *succursales* in the chief cities of France. The Banque Nationale of Belgium is conducted upon the model of the Bank of France. It issues notes for 20, 50, 100, 500, and 1000 francs. In Germany, the Imperial Bank (Reichsbank) was established by an act passed in 1875, with the right to issue notes not covered by bullion in the vaults, to the amount of 250,-

000,000 marks ($62,500,000); while a number of subordinate banks are permitted to issue uncovered notes to the amount of 135,000,000 marks ($33,750,000). Notes are issued for 5, 50, 100, 500, and 1000 marks. The State itself (by an act passed in 1874) may issue 120,000,000 marks in small notes for the general convenience of the public. For a more detailed treatment of the banking systems of foreign countries, see articles on those countries.

Historical Sketch. The origin of banking is in remote antiquity, but in its nature and scope great changes have been made during the last four centuries. The modern banker is a dealer in credit, while in ancient times the so-called banker was a mere custodian of other people's money and a buyer and seller of foreign moneys. The bill of exchange appears to have been the first credit instrument handled by the early bankers. Explorers have discovered evidence of its use in Assyria several thousand years before Christ. In Athens and in Rome several hundred years before Christ, men who would now be called bankers made a business of receiving money on deposit and of buying foreign money and foreign bills of exchange. In Rome bankers were called *argentarii*, or dealers in money. Although at first their profits came altogether from commissions upon deposits and from the exchange of domestic for foreign money, they finally became dealers in bills of exchange, and even loaned the money which had been intrusted to them, a credit on their books being transferred by an order resembling the modern check. Livy first mentions the argentarii at the year B.C. 350, and they are frequently referred to in Latin literature of a later date. They were not patricians and had no social status, being despised by the nobles and hated by the common people. By the time of Justinian, the business of banking, involving a comparatively large use of credit, had become firmly established, and a complete body of jurisprudence relating to the subject had been developed.

During the Middle Ages, the insecurity of property and the risks attending commerce practically reduced the business of banking once more to that of mere money-changing. In Italy, at this time, the bankers were known as *campsores*, or dealers in foreign money. There was still traffic in bills of exchange; but for several centuries banking in the modern sense of the term, implying the lending of other people's money, the issue of notes as a medium of exchange, and the transfer of accounts by order or check, was practically unknown. The rise of modern banking really dates from the establishment at Venice of the Banco di Rialto, in 1587. For two centuries prior to this date private bankers in Venice had been receiving deposits, making loans, and transferring credits upon order. The Banco di Rialto received deposits subject to call, and permitted its customers to transfer their credits by order. In 1619 this bank was absorbed by the Banco del Giro. This bank loaned 500,000 ducats to the Government of Venice. Depositors were given receipts in proportion to the weight of the gold or silver coins which they deposited, and these receipts were used as money. As the current coinage in Venice was in bad condition, it often happened that credits upon the Bank of Venice were at a premium. On several occasions, however, the paper of the bank was at a discount, on account of excessive issues. The bank survived until 1805, when its affairs were liquidated under a decree of Napoleon.

The Bank of Amsterdam and the Bank of Hamburg, established in the same century as the Banco del Giro in Venice, performed banking functions of a similar character. They did not issue bank-notes, and were not authorized to make loans; but their credits, based upon coins deposited, became a very popular medium of exchange in the settlement of all large transactions. These credits were known as 'bank money,' and are generally regarded as the first step in the evolution of the check and deposit system now in common use in Europe and the United States. The Bank of Amsterdam was successfully managed from 1609, the date of its establishment, until the middle of the following century, when secret advances to the Dutch East India Company resulted in the destruction of its credit. It was liquidated by a royal decree in 1819. The Bank of Hamburg was always conservatively managed, and survived until 1873, when the adoption of an Imperial coinage and bank currency rendered its services no longer necessary.

It was during the Eighteenth Century that the two characteristic features of modern banking—the issue of notes not covered by coin, and the granting of deposit accounts upon the mere credit of borrowers—were finally evolved. China appears to have been familiar with bank-notes for at least twelve centuries, but their use in Europe dates only from 1661, when the Bank of Sweden issued notes to avoid the transportation of copper coin. In England the recognition of the bank-note as a representative of credit rather than as a mere warehouse receipt secured by an equivalent deposit of coin, was not realized until the end of the Seventeenth Century, when the Bank of England was created. The Bank of Scotland, chartered in 1695, received privileges similar to those possessed by the Bank of England.

Consult: Bagehot, *Lombard Street* (New York, 1874); Conant, *A History of Modern Banks of Issue* (New York, 1897); Dunbar, *Theory and History of Banking* (New York, 1891); Francis, *History of the Bank of England* (London, 1848); Gilbart, *History, Principles, and Practice of Banking* (London, 1882); White, *Money and Banking* (Boston, 1896); Breckinridge, *The Canadian Banking System* (New York, 1895); *Report of the Monetary Commission* (Chicago, 1898); *Reports of the Comptroller of the Currency.* See also Credit; Currency; Interest; Savings-Banks.

BANK BILLS, or **NOTES**. The promissory notes of a bank or banker, issued under special legal authority, payable to bearer on demand. They differ from an ordinary promissory note in two important particulars: they may be reissued after payment, and they do not become stale, or overdue, by the expiration of a reasonable time after their issue. Bank of England notes are a legal tender in England for all sums exceeding £5, except by the Bank. In the United States, bank-bills are not a legal tender. Whether a demand or payment must be made before an action can be brought on a bank-bill is a question upon which the decisions in the United States are in conflict. Consult the authorities referred to under the title BANK, BANKING.

BANK DIS'COUNT. See BANK, BANKING.

BANK HOL'IDAYS. In England Sunday, Christmas Day, Good Friday, Easter Monday, the Monday in Whitsun Week, the first Monday in August, the 26th of December (called *Boxing Day*), or, if that day is Sunday, the 27th, or any day appointed by Order in Council in place of either of the last four days, and any day appointed by royal proclamation as a public fast or thanksgiving day. Banks are to be kept closed on such days, and bills and notes payable on any of these days are declared payable on the next following business day. In this country every public holiday (q.v.) is, as a rule, a bank holiday; and negotiable paper payable on such day, without grace, is payable the next business day. If it is entitled to days of grace (see BILL OF EXCHANGE), and the last day of grace falls on a public holiday, it is payable on the last preceding day, in the absence of a statute varying this rule.

BANK-NOTES, MANUFACTURE OF. The chief aim in the manufacture of bank-notes is to render counterfeiting impossible, or, at least, easy of detection. This is usually accomplished by peculiarity of paper, design, ink, and printing, or by a combination of these means. English bank-notes are printed with the blackest and most indelible ink on a peculiar kind of handmade paper bearing a distinctive water-mark. (See PAPER.) As a further security against counterfeiting, a self-registering machine is used for impressing upon the note a mark known only to the Bank of England officials. The various banks in Scotland issue bank-notes of a paper much like that used in England, but usually they employ several colors of ink besides black in printing them. Until 1837, copper-plate printing was employed for English bank-notes; and from 1837 to 1855 the method of Perkins Heath for the reproduction of designs by the mill and die process was employed. In this process the design was engraved on a soft steel plate, which was then hardened, and the pattern transferred by pressure to a soft steel roller, where, of course, it appeared in relief. The roller of the mill was then hardened, and used to reproduce the pattern on the plate from which the printing was actually done. The great advantage of this method was that a large number of plates of the same pattern could be produced with comparative ease. In 1855 electrotype printing was introduced by Smee and the mechanical officials of the Bank of England, and since that time all English bank-notes have been printed from the electrotype plates.

The extensive use of treasury notes or other forms of paper currency in the United States has led the Bureau of Engraving and Printing of the Treasury Department at Washington to develop methods for producing notes which should not only be difficult to counterfeit, but which should be legible, durable, and artistic in design. In many instances, celebrated artists have been engaged to furnish designs for notes; but more generally the designs have been prepared by the artists belonging to the Bureau. Whoever the designer may have been, the work of transferring the design to the plate and the entire mechanical production of the note, except the manufacture of the paper, is carried out by the Bureau. The paper is made by a private concern only for the Government, the process of manufacture being patented. The principal ingredients of the paper are linen and cotton fibre, into which threads of silk are introduced in such a manner as to be visible in the printed note. The process of manufacture, as carried on at the Bureau of Engraving and Printing, is as follows:

The design of the note, including all the lettering and devices thereof, upon a sheet of the required form, being in the hands of the workmen, they first proceed to make the die. A plate of soft, highly polished steel is selected, and upon it is sketched the design, or such portions of it as are of the same color, if more than one tint is to be used in printing. A separate die is needed for every shade used. This is then carefully engraved. It will be understood that, unlike the method of wood-engraving, the lines which take the ink are cut into the plate instead of being raised above its surface. The engraver is limited to such parts of the work as can be done by hand; other portions, such as the scrolls and elaborate tracery, are done entirely by machinery. The principal apparatus used is a complicated piece of mechanism, which actuates a plate to which the steel for the die is attached and caused to press against a diamond point. Perfectly true and delicate lines are thus cut into the metal, making figures technically termed 'cycloid rosettes.' The machine, in theory, somewhat resembles a kaleidoscope, as it requires to be set by accurate pointers and dials to some special figure, which, when the combination is changed, can never be reproduced. One of these instruments is in use, and its work, together with that of the geometrical lathes, can be readily recognized on the national currency.

The die, being complete, is ready for the transfer process. Postage stamps, for instance, are made in sheets of two hundred, so that the die must be transferred that number of times on a single plate. It is first case-hardened, and then put, face up, in a press which is made with a combination of levers actuated by the foot, so as to give the tremendous pressure of twenty-one tons on a single line. A cylinder or 'roll' of soft steel is, by careful gauging, placed so as to rest directly over the face of the die, and, at the same time, is so arranged as to revolve easily along its surface even when under the full weight. The pressure is then applied, with the result of forcing the soft steel of the roll into the lines of the engraving, so that when complete, the periphery of the cylinder shows an exact reproduction of the face of the die, only the lines sunk on the die are now raised on the roll. Next, the cylinder is case-hardened. Then the plate—soft steel again—to be used for the final printing is placed in the press, and the roll is arranged above it. Now the cylinder leaves its impression on the plate, the hard steel of the raised lines cutting deep into the surface, so that a precise duplicate of the original die is obtained. This is repeated as many times as there are to be repetitions of the stamp or note on the single plate, which is then ready for use.

The ink for printing is made on the spot. In a large room are ten or a dozen paint-mills, which are busily grinding the colors and oil together. Two large ones are filled with green ink, another with vermilion, while others are making blue, red, and other tinted inks. Nothing but the finest color and the best boiled linseed oil is here used. The next important department is the paper-room, where the paper is received, and cut in sheets of the required size. The notes are made of a peculiar material containing colored fibres. The paper for postage stamps is made of the best linen. It is of short fibre, very fine, and extremely strong. The sheets on which currency is to be printed are counted as soon as received, and the results reported for verification. They are placed in heaps, marked off in sets of 100 and 1000. When issued for printing, the workman receiving them has to present an order signed by the superintendent. They are then charged against him in his pass-book, when he carries them away to be damped by simply wrapping them in wet cloths. The presses used are simply cylinders moved by long-handled levers, and are each attended by three men and a girl. The plate rests upon a small iron box warmed underneath by gas-flames. A workman using a plate-printer's roller rapidly covers the plate with ink and passes it to another operative at his side, who wipes it with a soft cotton cloth, and then polishes with the palm of his hand covered with whiting, thus removing the ink from its surface, but not from the engraved lines, which remain filled. This done, the plate is placed, face up, in the press. The girl stands ready with a sheet of damp paper, which she carefully lays upon the plate. The pressman turns the levers, the cylinder revolves, the plate passes under it, and the paper is removed, bearing a perfect impression. As soon as a printer has completed the work assigned to him he hands it, made up in 'books' of 100 impressions, each sheet inclosed between two others of brown paper, to a clerk. He is then credited with his delivery, spoiled sheets being counted the same as perfect ones, so that if his return is correct his debit account on his pass-book, which is kept in a different apartment and by other employés, is thus balanced. The finished impressions are now carefully counted and inspected. The spoiled ones are removed and sent to the proper agents to be burned, while the others are hung in the drying-room. This apartment is heated by steam-pipes, and the paper is suspended by wires for a day or two, until perfectly dry. Then the brown paper is removed, and the sheets, packed between leaves of press-board, are subjected to the action of a powerful hydraulic press. They are then once more inspected and counted.

BANK OF NORTH AMER'ICA. See BANK, BANKING.

BANK OF THE UNIT'ED STATES. See BANK, BANKING.

BANK'RUPTCY (*Bank* + Lat. *ruptus*, broken, from *rumpere*, to break, It. *banca rotta*, usually taken to refer to the former Italian custom of destroying the money-counter when a bank failed). In popular usage, the inability of a person to pay his debts, or the financial condition of one who has failed in business; as a technical law term, the status of one who has been adjudged a bankrupt.

The legal position of a debtor in primitive communities is one of great hardship. He is at the mercy of his creditor, who, after exhausting the property of the debtor, may generally seize his body and force him to work out the debt or become a slave. With the development of society, various devices are resorted to for the amelioration of the debtor's condition, terminating, as a rule, in a more or less satisfactory system of bankruptcy, the cardinal principal of which is that one who is unable to pay his debts in full may be discharged therefrom upon giving up all his property for ratable distribution among his creditors. The history of bankruptcy and insolvency legislation in England furnishes a good illustration of this statement. While it is true that there was no process of the common law by which a man could pledge his body or surrender his liberty for the payment of his debts, the courts permitted a legal fiction to grow up that a debtor who did not pay a judgment against him was guilty of a breach of the peace, subjecting his body to imprisonment by the writ of *capias ad respondendum*. The feelings of judges toward debtors, during that period, are disclosed by a recorded opinion of Mr. Justice Hyde, in 1663: "If a man is taken in execution, and lies in prison for debt, neither the plaintiff, at whose suit he is arrested, nor the sheriff, who took him, is bound to find him meat, drink, or clothes. He must live on his own, or on the charity of others; and if no man will relieve him, let him die, in the name of God, says the law, and so say I." A little more than a century prior to this utterance the first bankruptcy statute was passed in England. It shows that Parliament agreed with the judiciary in its opinion of insolvent debtors—that they were dishonest, and deserved punishment. This act (34 and 35 Hen. VIII., c. 4) was entitled, "Against such as do make Bankrupt," and recites that "divers and sundry persons, craftily obtaining into their hands great substance of other men's goods, do suddenly flee to parts unknown, or keep their houses, not minding to pay or restore to any, their creditors, their debts and duties, but of their own wills and pleasures consume the substance obtained by credit of other men for their own pleasure and delicate living, against all reason, equity and good conscience." It then proceeded to confer upon various judicial officers power to take the offending debtors and their property; to sell the latter, and to divide the proceeds ratably among creditors. Under Elizabeth and James I., additional bankruptcy statutes were passed, all keyed to the same note of suspicion and harsh judgment of the failing debtor. The act of 21 James I. (c. 19) was especially severe, providing that the debtor who could not render some just reason why he became bankrupt, should stand upon the public pillory, have one of his ears nailed thereto, and then cut off. If his failure to pay his debts was due to fraudulent practices, he might be put to death.

With the growth of English trade, the hazards of commercial enterprises were so multiplied, and the complexity of business relations so increased that this Draconian legislation against failing debtors was found to be not only unjust but impolitic. Accordingly, bankruptcy laws underwent a radical change, until, in Blackstone's time, they were considered "as laws calculated for the benefit of trade, and founded on principles of humanity as well as justice; and to that end," adds the great commentator, "they confer some privileges, not only on the creditors, but also on the bankrupt or debtor himself. On the creditors, by compelling the bankrupt to give up all his effects to their use, without any fraudulent concealment; on the debtor, by freeing him from imprisonment and discharging him from his debts, if he had been honest."

These laws, however, applied only to traders, because it was thought that they were, "generally speaking, the only persons liable to accidental losses," and that it was "an unjustifiable practice for any person but a trader to incumber himself with debts of any considerable value." Those who were not traders could get relief from imprisonment for debt only to the extent provided by an entirely distinct set of statutes, those relating to insolvency (q.v). Although Blackstone describes the bankruptcy laws of his age in the most optimistic vein, deeming them, as he did almost every other branch of English law, the perfection of human reason, they have been modified repeatedly during the last hundred years. Thirty-eight bankruptcy acts have been passed in England, beginning with that already mentioned under Henry VIII., and, for the present, closing with the act of 1883, as amended in 1890. These statutes have been a series of experiments, and although the latest had for its motto, "The estate for the creditor, not for the debtor, nor for the trustee," it cannot be considered a finality, for it has not accomplished its avowed purpose of satisfying the creditor class. This is shown by the fact that nearly one-half of the business insolvencies in England are liquidated under deeds of settlement or voluntary compositions with creditors outside of the bankruptcy court.

Under the present bankruptcy acts in England and in the United States, proceedings in bankruptcy may be instituted by the debtor or by creditors. The former is called a voluntary, the latter an involuntary, proceeding. Each is begun by filing a petition. The debtor's petition must state that he is unable to pay his debts, and is willing to surrender all of his property to the use of his creditors. Whether a person is liable to be adjudged a bankrupt upon the petition of creditors does not depend upon his ability or inability to pay his debts, but upon his having committed an act of bankruptcy. Such at least is the English doctrine; but it is modified to some extent in the United States. The United States Bankruptcy Statute of 1898 enumerates five classes of acts of bankruptcy: First, conveying, transferring, concealing, or removing, or permitting to be concealed or removed, any of his property with the intent to hinder, delay, or defraud any of his creditors; second, transferring, while insolvent, any of his property with intent to prefer a creditor or creditors over others; third, suffering, while insolvent, any creditor to obtain a preference through legal proceedings, and not securing the vacating or discharge of such preference; fourth, making a general assignment for the benefit of creditors; fifth, admitting in writing his inability to pay his debts, and his willingness to be adjudged a bankrupt on that ground.

After the debtor is adjudicated a bankrupt, a trustee is appointed by the creditors (subject to some supervision by the Board of Trade in England, by the bankruptcy court in this country), who becomes vested not only with all the property in possession of the debtor at the time when he was adjudged a bankrupt, but with all that he had transferred in violation of the statute or in fraud of creditors. It is quite important that the trustee's title should relate back of the adjudication. Otherwise a failing debtor could always defeat one of the main purposes of the bankruptcy statute—that of securing a ratable division of all his estate among all his creditors—by turning over his property to one or more favored creditors. By providing for the relation back of the trustee's title, every transfer of his property made or suffered by an insolvent debtor, with intent to prefer a creditor over others, within three months in England, four months in the United States, before the filing of the petition in bankruptcy, is rendered invalid, and the property may be brought back into the estate for division among creditors. Moreover, even when a creditor has obtained security from the debtor, which is not invalidated by the statute, he is not allowed to share in the bankrupt's estate unless he turns over the security to the trustee. It is the duty of the bankrupt to make a full disclosure and surrender of his property, save such as is exempted by statute, as well as to supply a full and honest list of his creditors. Upon establishing their claims, in the prescribed manner, the creditors are entitled to take part in the meetings provided for by statute, as well as to receive dividends. If the bankrupt's business conduct has been honest and legal he is entitled to a discharge from all provable debts, with few exceptions. He may be punished criminally for certain violations of the bankruptcy law; and a discharge from debts will be denied for various reasons. Under the present Federal statute it will be denied if he has committed an offense punishable by imprisonment, as provided therein, or if he has fraudulently destroyed, concealed, or failed to keep books of account, or records, showing his true financial condition. The English act gives to the court a much more extended disciplinary jurisdiction over bankrupts. It provides for a searching investigation into their conduct and affairs prior to, as well as during, the proceedings, and gives to the court a very large discretion in granting, denying, or conditionally withholding a discharge. Even when a discharge is obtained, it does not relieve the bankrupt, as a rule, either in England or here, from debts grounded in fraud or other moral misconduct. In this country no political disability follows an adjudication in bankruptcy. In England, however, an adjudged bankrupt is disqualified from sitting or voting in either house of Parliament, or from holding various other specified offices. This disqualification ceases as soon as the bankrupt is discharged, if the court certifies that he was free from misconduct, and at the end of five years from a discharge in other cases.

Article I., Sec. 8, of the Federal Constitution, gives to Congress power "to establish . . . uniform laws on the subject of bankruptcies throughout the United States." This grant of power to Congress does not exclude the States from legislating on this subject; but a Federal bankruptcy statute does suspend, while in force, the operation of a State statute covering the same ground. Congress has exercised this power but sparingly. It passed the first bankruptcy law in 1800. This was copied quite closely from the English statute of that time. As it applied only to traders, it soon became unpopular with other classes, and was repealed in 1803. The next venture in bankruptcy legislation by Congress was made in 1841, at the request of insolvent debtors, who, after the panic of 1837, had become a numerous and influential class. This bill proved no more satisfactory than its predecessor, and it was repealed after a short life of two years. After the repeal of this act no serious attempt was made to pass a Federal bankruptcy law until 1864, when Congressman Jencks, of Rhode Island, introduced a bill upon this subject. His very instructive speech, explanatory of its purpose and provisions, is contained in the *Congressional Globe* for 1863-64, at page 2636. The bill met with serious opposition, and did not become a law until June, 1867. In 1874 it was amended in various respects. One of the changes required one-fourth in number and one-third in value of the creditors to unite in an involuntary petition. This made it very difficult for creditors to force a debtor into bankruptcy, and thereafter the proceedings were mainly voluntary. Moreover, the charges upon bankrupt estates under this law were heavy, often exorbitant, and the creditor class was disappointed in its workings. Their agitation for its repeal was crowned with success in 1878.

Twenty years elapsed before the fourth and present act was passed by Congress. It was the outcome of a compromise between the friends of a bill fashioned largely after the present English statute, and those who were either opposed to any Federal legislation on the subject, or were anxious to limit such legislation within the narrowest possible bounds. Its definition of acts of bankruptcy is much narrower than that of the English statute. Even one who has committed an act of bankruptcy may defeat an adjudication by convincing a jury that the aggregate of his property is, at a fair valuation, sufficient in amount to pay his debts. Its provisions relating to a discharge are very lax, as has been pointed out already. It secures, however, a fairly expeditious, convenient, and economical administration of bankrupt estates. While the Federal district courts have original jurisdiction in bankruptcy, the statute provides for referees, who may perform many of the judicial duties in bankruptcy proceedings, and whose districts are not to extend, as a rule, beyond the limits of a single county, thus making it easy and inexpensive for suitors to attend court. Consult: Brandenburg, *Law of Bankruptcy* (2d ed., Chicago, 1901); Bump, *Law and Practice in Bankruptcy* (11th ed., Washington, 1898); Baldwin, *Concise Treatise Upon the Law of Bankruptcy* (8th ed., London, 1900); Robson, *Treatise on the Law of Bankruptcy* (7th ed., London, 1894).

BANKS, Sir Joseph (1743-1820). An English naturalist. He was born in London, February 13, 1743, the only son of William Banks and Sarah, daughter of William Bale, who left him a large fortune. He graduated at Oxford, imbued with a profound interest in natural history, and it was by his exertions that lectures in natural history were first introduced into that university. In 1766, after having been elected a fellow of the Royal Society, he began his travels by a journey to Newfoundland and Labrador to collect plants, whence he brought the first scientific collections from that region. In 1768-71 he accompanied Cook's expedition round the world in a vessel, the *Endeavour*, equipped by himself, in which he visited successively Rio de Janeiro, Cape Horn, Tahiti, New Zealand, Australia, the Malay Archipelago, Cape of Good Hope, and Saint Helena. His friend, the botanist Solander, and two artists accompanied him on this expedition. Botany Bay and the Endeavour River were named at this time, and Cook also gave the name of Banksland to an island south of New Zealand. During this visit to Tahiti, Banks sowed seeds of various Brazilian plants. The death of Dr. Solander long delayed the publication of the manuscripts and plates of the botanical results of the expedition, which were preserved in the British Museum, and finally published in 1900. As one result of this expedition the marsupial fauna of Australia first became known to science. In 1772 Banks explored the Hebrides and Iceland, and discovered the great geysers of the latter country. He was elected president of the Royal Society in 1778, which office he held for 42 years. While he published little himself, he did much to arouse an interest in natural science in Great Britain, and was a patron and protector of scientists in general. His great collections and library, now preserved in the British Museum, were accessible to naturalists, and were the basis of many important systematic works by Fabricius, Broussonnet, Gärtner, and Robert Brown. He married Dorothea, daughter of William Weston-Hugessen, in 1779, but left no children. He died in Isleworth, January 19, 1820. Consult: Duncan, *Short Account of the Life of Sir Joseph Banks* (Edinburgh, 1821); *Sir Joseph Banks and the Royal Society* (London, 1846).

BANKS, Louis Albert (1855—). An American clergyman and author. He was born at Corvallis, Ore., and educated at Philomath College, Ore., and at Boston University. He is pastor of the First Methodist Episcopal Church in Cleveland, Ohio. In 1893 he was the Prohibition candidate for governor of Massachusetts. His publications include: *The People's Christ* (1891); *The Saloonkeeper's Ledger* (1896); *Live Boys in Oregon* (1897); *Immortal Hymns and Their Story* (1898); *Twentieth Century Knighthood* (1900).

BANKS, Nathaniel Prentiss (1816-94). An American soldier and politician, born at Waltham, Mass., where he received a common-school education, and learned the trade of a machinist. He then edited a local paper; studied law, and was admitted to the bar; served several terms in the Massachusetts Legislature, for part of the time as speaker of the Assembly, and in 1853 was chairman of the Massachusetts Constitutional Convention. In 1853, also, he was elected to Congress by a coalition of the Democrats and Free-Soilers, but soon joined the 'Know-Nothings,' and afterwards identified himself with the newly organized Republican party. During his second term in Congress he was Speaker of the House, having been chosen on the 133d ballot. He was Governor of Massachusetts from 1857 to 1859, and then became president of the Illinois Central Railroad, which position, however, he resigned on the outbreak of the Civil War, to enter the Federal service. He was commissioned major-general of volunteers on May 16, 1861; commanded the Fifth Army Corps along the Upper Potomac and in the Shenandoah Valley in 1861-62, and on March 23, 1862, a part of his army under Shields defeated Jackson at Winchester. In April, 1862, at the head of two divisions, he was assigned to the task of protecting the Shenendoah while McClellan proceeded against Richmond by way of the Peninsula; but, soon weakened by the withdrawal of one of his divisions, he was defeated by Jackson at Front Royal on May 26, and was forced back upon the Potomac. Soon afterwards he joined Pope, then commanding the Army of Virginia, and on August 9 was defeated by a force of Confederates in the battle of Cedar Mountain. He then was in command for a time of the defenses of Washington, and in December, 1862, commanded the expedition to New Orleans, and replaced Gen. B. F. Butler as commander of the Department of the Gulf. In the spring of 1863 he conducted the campaign against Port Hudson (q.v.), which, after resisting several assaults, was finally surrendered, July 9, 1863, on the receipt of the news that Vicksburg, farther up the river, had been taken by Grant. Early in 1864 General Banks was directed to lead an expedition up the Red River, with a view to regaining western Louisiana from the Confederates, but he was defeated by Gen. Richard Taylor at Sabine Cross Roads, and was forced to withdraw to the Mississippi. In May, 1864, he was relieved of his command, and, resigning his commission, was again elected to Congress, where he served, with the exception of one term, until 1877, and was for many years chairman of the Committee on Foreign Relations. He was again elected to Congress in 1888, but after 1890 suffered from a mental disorder and withdrew wholly from public life. In 1891 Congress voted him an annual pension of $1200. Because of his factory life when a young man, he was popularly known as 'the Bobbin Boy.'

BANKS, Thomas (1735-1805). An English sculptor. He was born at Lambeth. At fifteen he was apprenticed to a wood-carver, and in the evenings studied sculpture under Scheemakers. He received premiums for models in sculpture from the Society for the Encouragement of the Arts, entered himself as a student of the Royal Academy, and obtained the gold medal, which entitled him to study three years in Rome. At this time he married Miss Wooton, an heiress. In Rome he devoted himself to the study of the antique, and executed those works in marble which were afterwards purchased by Catherine II. of Russia, namely, "Cupid Catching a Butterfly" and "Caractacus Brought Prisoner to Rome." He returned to England, and in 1781 visited Russia, where he spent a year, and completed for the Empress a group called "Armed Neutrality." In his own country the lofty and noble style of his works was unappreciated. Such works he continued to create to please himself. His commissions were chiefly for monumental sculpture. He was one of those who must serve as a stepping-stone by which others coming after may win renown. He may be called the father of English ideal sculpture, for he prepared the way for Flaxman to make successful the classical spirit in English art. In the entrance-hall of Burlington House is his model of "Achilles Mourning the Loss of Briseïs," never executed in marble. Consult: Leader Scott, *Sculpture: Renaissance and Modern* (New York, 1886); A. G. Radcliffe, *Schools and Masters of Sculpture* (New York, 1894).

BANKS, Sir William Mitchell (1842-1904). A Scotch surgeon and anatomist, born in Edinburgh. He graduated in 1864 at Edinburgh University in 1845-47, was demonstrator of anatomy in the University of Glasgow, and subsequently, at Liverpool, became known as a consulting and operating surgeon. He reëstablished the Medical School of Liverpool, and founded University College, one of the three colleges constituting Victoria University. For some time he was professor of anatomy in University College. In 1886 he was elected first president of the Liverpool Biological Society, and in 1897 delivered the address in surgery before the British Medical Association assembled at Montreal. His publications include various papers and addresses.

BANK'SIA. A genus of Australian shrubs of the natural order Proteaceæ, and named in honor of Sir Joseph Banks. A few of the species become small trees. They have hard, dry leaves, and present a remarkable appearance from the umbellate arrangement of their branches, which bear toward their extremities oblong heads of very numerous flowers, which secrete much honey. Some of the species are now frequent ornaments of greenhouses in Great Britain. They are abundant in all parts of Australia, forming a characteristic feature of its vegetation, and are called honeysuckle trees. *Banksia grandis* exceeds all the rest of the genus in size, attaining a height of fifty feet.

BANK-SIDE. The south bank of the Thames, between Blackfriars and Waterloo bridges, London. Here stood the famous Globe Theatre in Shakespeare's time.

BANKS IS'LANDS. A group of islands in the Pacific, a dependency of New Hebrides (q.v.). They number seventeen, and are situated in latitude 13° S., and longitude 168° E. The most important of them are Vanua Lava, Saint Maria, Ureparapara (with a good harbor), and Valua. There is a mission-house on the small islet of Mota. The total area of the group is estimated at about 150 square miles, and the population at 5000.

BANKS LAND. An island in the Arctic Ocean, 70 miles southwest of Melville Island (Map: Arctic Regions, D 6). It is intersected by the parallel of 74° N., and by the meridian of 116° W. It was discovered by Parry in 1819.

BANK SWAL'LOW, or **SAND MAR'TIN.** This familiar swallow is one of the most numerous and widespread of all birds. It is known under one or another name throughout nearly the whole world, wherever the cut banks of streams give it an opportunity to make its burrowed nesting-place. The common species of America, Europe, and Asia is *Clivicola riparia*. From eastern India to southern China it is replaced by another species (*Clivicola Sinensis*), which migrates in winter to the Malayan Archipelago. Egypt has another species (*Clivicola Shelleyi*); the brown-collared bank swallow (*Clivicola cincta*), abounds throughout tropical Africa, and several other forms are recognized elsewhere, but all are closely alike in appearance and habits.

The bank swallow is easily distinguishable from all other American swallows by its lesser size and the absence of metallic lustre in its plumage, which is sooty brown-black above and white on the lower surface of the body, with a dusky band across the breast; the beak is very small and weak, and the tail short and not deeply forked. This swallow is migratory in the temperate zone, where it spreads in summer to the borders of the Arctic Ocean, and retires in winter not only in the tropics, but beyond them to the southern parts of South America and Africa, but its alleged breeding there is probably erroneous, arising from confusion with local resident species. Everywhere it is of local distribution, seeking the borders of water-courses and lakes where steep banks of sandy earth afford it a chance to dig holes, which it does in companies sometimes numbering hundreds of pairs, whose homes are often crowded within a small space. The nests are placed at the inner ends of deep burrows, each made by a pair of birds. In excavating the feet seem to be the principal instruments, scratching away the soil, and scraping it out backward to the mouth of the hole, until the required calibre and depth are attained. Both sexes work at the task diligently, and the hole is sometimes 7 or 8 feet in depth—a wonderful achievement for a bird so weak and ill-provided with digging tools. The scene when a twittering colony of swallows are busy at work upon the face of a sandbank is a most pleasing one, and the labor is often interrupted by sudden excursions of the whole flock, as if for simultaneous rest and recreation—"sailing and circling round . . . making, when the sky is blue and the sun bright, a warm and delicious picture, such as the Greeks must have loved to gaze on." Excellent and picturesque accounts of the bird and its ways abound in the literature of ornithology, but none is more pleasing and instructive than that by Edmund Selous, in *Bird Watching* (London, 1901). At the interior extremity of the burrow an enlargement is made for the accommodation of a slight nest of straw and feathers, where from three to five pure white eggs are laid. The males roost at night, and often rest by day in the entrances to their tunnels; and there the young may be seen peering out some days before they dare to try their wings. Small hawks swoop upon the colonies and seize one from time to time. English sparrows often take possession of the holes, dragging out the property of the rightful owners and substituting their own; and snakes and mice occasionally gain entrance; but against most enemies these birds are well protected in their deep caves. A swallow of similar nesting habits, but otherwise quite different, is the Rough-winged (q.v.). Consult Ingersoll, *Wild Life of Orchard and Field* (New York, 1902). See SWALLOW and Plate of SWALLOWS.

BANN. A river in Ireland, rising in the southern part of Downshire. It flows northwest, passing through Lough Neagh at its southwestern end, then passes between the counties of Londonderry and Antrim, and falls into the Atlantic at Portstewart. The part of the river south of Lough Neagh is called the Upper Bann, and has a length of 25 miles, while the Lower Bann, or the part north of Lough Neagh, is about 40 miles long. The Bann is navigable for light vessels, and has salmon fisheries.

BANNATYNE (băn'ȧ-tīn) **CLUB.** A club founded in 1823 by Sir Walter Scott, who was its first president, and by other Scottish antiquarians, for the purpose of collecting and publishing all history and literature connected with their country. It was named after a Sixteenth Century collector of Scottish poetry, and was discontinued in 1859. During its existence, it printed 116 rare works in editions of 100 copies each, which were distributed among the members. A full set of these works brought £235 in 1887.

BAN'NEKER, BENJAMIN (1731-1806). A negro mathematician. He was a native of Maryland, and was a protégé of Thomas Jefferson. His grandmother, an Englishwoman, taught him to read and write; and after his fiftieth year he began to study mathematics with special reference to astronomy. In 1792 he issued an almanac of his own making, and continued the series annually throughout his life. He assisted in fixing the boundary lines of the District of Columbia, and in laying out the city of Washington. For his biography consult Latrobe (Philadelphia, 1848), and Morris (Baltimore, 1854).

BAN'NER (OF. *banere*, *baniere*, Fr. *bannière*, *bandière*, Low Lat. *bancria*, *banderia*, from *bandum*, standard; cf. Goth. *bandwa*, sign, token, OHG. *bant*, band). Strictly, a kind of flag painted or embroidered with arms, and of a size proportioned to the rank of its bearer; often fringed with the principal metal and color of the arms. The chief distinction between banners and other flags, such as standards, pennons, etc., is that it is square, or nearly so, while the others are, as a rule, elongated. See FLAG; STANDARD; ENSIGN.

BAN'NERET (OF. *baneret*, *banneret*, from *banere*, banner). A knight entitled to display a banner, as distinguished from a pennon. The honor was originally gained in feudal times by bringing a certain number of soldiers into the field, but later became the reward of heroic acts performed in the face of the enemy. The first banneret in England is said by Froissart to have been made by King Edward I., and the last bestowal of the honor was by Charles I., after the battle of Edgehill, the recipient being John Smith, who had recovered the royal standard from the insurgents, although there are three doubtful instances in the Eighteenth Century. The ceremony of the creation of a knight-banneret must have been very impressive to persons filled with the ideas which were prevalent in the ages of chivalry. The King, or his general, at the head of his army, drawn up in order of battle, after a victory, under the royal banner displayed, attended by all the officers and nobility of the Court, received the banneret-elect, who was not necessarily a knight previously, led between two knights of note or other men famous in arms, carrying his pennon in his hand, the heralds walking before him and proclaiming his valiant achievements, for which he deserved to be made a knight-banneret, and to display his banner in the field. The King, or general, then said to him: "Advance, banneret!" and cut off the point of his pennon, thus altering its shape to that of a banner (q.v.). The new knight, with the trumpeters sounding before him and the nobility and officers bearing him company, was sent back to his tent, where a noble entertainment was provided by the King. The word has also been applied to certain inferior magistrates in Switzerland and Italy.

BAN'NOCK (Gæl. *bonnach*, *bannach*). A cake of home-made bread, common in the country parts of Scotland, but now less so than formerly. It is usually composed of pease-meal or pease and barley-meal mixed; prepared without any leaven, it is baked on a circular plate of iron called a girdle. When made of mixed meal it is called a mashlum bannock. 'Bannocks of barley-meal' form the theme of a popular Scottish song. The bannock is doubtless of great antiquity, being, in fact, the primitive cake, only varied in material, of every country.

BAN′NOCKBURN (Gæl., the stream of the white knoll; *burn*, AS. *burna*, a small stream; cf. Ger. *Brunnen*, well). A village in Scotland, 3 miles southeast of Stirling, on the Bannock Rivulet, the scene of a great battle, fought on June 24, 1314, in which Robert Bruce, with 30,000 Scotch, gained a signal victory over Edward II. with 100,000 English, and secured his throne and the independence of Scotland. The victory was due in great measure to the clever device of Bruce, who caused the ground in front of his position to be undermined in all directions. The English cavalry blundered into the hidden pits, were rendered helpless themselves, and threw the rest of the army into confusion. The English are said to have lost 30,000, and the Scotch 8000, men. The 'bore-stone' on which Bruce is said to have fixed his standard on that day is still to be seen on an eminence near the scene of the fight. On the southeast of the field of Bannockburn, at Sauchie Burn, James III. was defeated June 11, 1488, by his rebellious subjects, and assassinated after the battle in a mill where he had taken refuge. See SCOTLAND.

BANNS (earlier also *bannes*, really plural of *ban*) **OF MARRIAGE.** The preliminary public announcement or proclamation, constituting a part of the religious ceremonial of marriage. It was made compulsory throughout Christendom by a decree of Innocent III. at the fourth Lateran Council of 1215, and is still employed both in England and in most Roman Catholic countries as an essential part of the religious celebration of matrimony. It is not necessary to the validity of marriage, however, which, in England and the United States, at least, could always be effected by a civil contract without ceremony. The object of this publication was to give notoriety to the act, so that all who had objections to the marriage might be enabled to state them in time. By the English Book of Common Prayer the announcement is required to be made in the terms of the rubric prefixed to the marriage service, on three Sundays preceding the ceremony. If any objections are offered, it is the duty of the clergyman to proceed no farther with the marriage; if, notwithstanding, he marries the parties, he will be liable to severe penalties by the ecclesiastical law, though not to an indictment. According to the old English Canon Law, the publication of banns might be made on holydays; but a change was made to Sunday by the first important English Marriage Act, the 26 Geo. II., c. 33; and although that act was afterwards superseded by the 4 Geo. IV., c. 76, the regulation as to Sunday is still in force.

The custom was continued in the early history of the English Colonies in America, and of the States formed from them. It is now practically obsolete in the United States, except in the Roman Catholic Church, although it is still recognized in the statutes of some of the States (Stimson's *American Statute Law*, Sec. 6120). See MARRIAGE, and consult the authorities there referred to.

BANQUETTE, băn-ket′ (Fr. dimin. of *banc*, bench). A projection or raised ledge forming a platform on the inner side of the parapet of a rampart, and designed to accommodate and protect the rifle fire of the defenders. Its dimensions vary according to circumstances. See FORTIFICATION.

BANQUO, băŋ′kwō. According to Holinshed, who probably drew his information from Boece, a Scotch warrior of the Eleventh Century, and the progenitor of the royal house of Stuart. In 1066 he is said to have joined Macbeth in a conspiracy against King Duncan, and to have been treacherously slain by his confederate. Shakespeare does not mention him as a conspirator, but only as Macbeth's victim. Boswell-Stone (*Shakespeare's Holinshed*, New York, 1896) says: "Banquo and Fleance were, I suppose, creatures of Boece's imagination."

BAN′SHEE, or **BEN′SHEE** (Gæl. *ban-sìth*; from *ban*, woman + *sìth*, Ir. *sighe*, fairy). An imaginary being in Irish folk-lore. The banshee is a female, who is called the wife of the fairies, and she makes herself known by wailings and shrieks, and thus gives warning of a death in the family, over which she is presumed to exercise a kind of guardianship.

BANSWARA, bän-swä′rȧ. A Native State of Rajputana, India, in the west of Malwa, bordering on Gujerat (Map: India, B 4). It extends from latitude 23° 10′ to 23° 48′ N., and from longitude 74° 2′ to 74° 41′ E. Area, 1500 square miles. Population, in 1891, 181,000; in 1901, 165,300.

BANTAM, băn-täm′ *or* băn′tam. A seaport town in the western part of Java, situated in the residency of the same name (Map: East Indies, C 6). It was formerly the capital of the kingdom of Bantam, and attained considerable commercial importance during the Sixteenth and Seventeenth centuries. At present it is in a state of decline.

BAN′TAM FOWL. See FOWL.

BANTAYAN, bän-tä′yän. A town of the island of the same name, belonging to the Province of Cebu, Philippine Islands, situated 62 miles north of Cebu. Population, 10,000.

BAN′TENG (native Malay name). An East Indian ox (*Bos sondaicus*), which inhabits the Malay Peninsula and Archipelago, except perhaps Sumatra, and is by some considered only a local race of the gaur of India. It is smaller and of lighter build than the gaur, with a longer and sharper head, and the horns more slender and rounded; there is less of a dorsal ridge, and the cow is peculiar in being bright dun in color, while the bulls more nearly resemble gaurs. This wild ox inhabits the jungle and is exceedingly wary and pugnacious. "No more bellicose and dangerous inhabitant of the [Javan] forest," says Forbes, "than a wounded bull need a hunter care to encounter." Yet it has been tamed from time to time, and interbred with the zebu and other domestic cattle, yielding a serviceable hybrid, of which large herds are kept by the Malays of Java and Bali. Consult Wallace, *Malay Archipelago* (New York, 1869). See Plate of WILD CATTLE, under CATTLE.

BANT′ING SYS′TEM. See OBESITY.

BAN′TRY (Ir. *Beantraighe*, descendants of Beann, of the royal race of Ulster). A seaport town and famous summer resort in the southwest of Cork County, Ireland, 44 miles west-northwest of Cork (Map: Ireland, B 5). It is at the head of Bantry Bay, where in 1796 a French fleet anchored and an abortive attempt was made to land. The chief trade is the export of agricultural produce. Population, about 3000. Consult Palliser, "Bantry Bay," in *United Service Magazine*, Vol. XVIII. (London, 1898).

BANTRY BAY. An inlet of Cork County, in the southwest extremity of Ireland (Map: Ireland, B 5). It runs east-northeast, is 25 miles long, from 3 to 5 miles wide, and affords safe anchorage for the largest ocean-going vessels.

BANTU, băn′tōō (*Ba-ntu*, the people). A group of negroes of Central and South Africa, forming Class VI. of Deniker (see AFRICAN LANGUAGES), in which they are divided into Western, Eastern, and Southern. One language unites this people, which otherwise shows considerable diversity. They are capable and progressive, and great colonizers. The principal subdivisions of the Bantu are the following: Bakalai, Bakuba, Baluba, Banda, Basuto, Bateke, Bechuanas, Bongo, Congo, Dualla, Fans, Herero, Lunda, Mpongwe, Nyoro, Ovampo, Rua, Sechuana, Swahili, and Zulu. Consult Deniker, *Races of Man* (London, 1900).

BANVILLE, bäɴ′vêl′, THÉODORE FAULLAIN DE (1823-91). A French poet, born at Moulins. A pupil of Hugo in prosody and rhetoric, he was a follower of Gautier in his passionless objectivity and hedonistic ethics. The titles of his volumes of poetry suggest the impassive nature of the contents: *Cariatides* (1842); *Stalactites* (1846); *Odelettes* (1856); *Odes funambulesques* (1857); and *Nouvelles odes funambulesques* (1869). The Franco-German War stirred him to a more passionate utterance in *Idylles prussiennes* (1871). He wrote also two charming dramatic sketches, *Gringoire* (1866), a sort of defense of poetry against the materialistic spirit of the Napoleonic régime, and *Socrate et sa femme* (1885). His prose pieces are poetry in all but form, whether they call themselves *Fairy Tales* (*Contes féeriques*) or *Parisian Sketches* (*Esquisses parisiennes*, 1859). His critical *Traité de la poésie française* (1872) won him the title of 'Legislator of Parnassus.' But it is as a poet alone that he survives—a poet of a disillusioned age, a product of the determinist philosophy of Taine and the cynical materialism of the Empire. In form, as in ethics, he is a sensualist, reviving the artificial stanzas of the Fourteenth Century, and in this becoming a forerunner of Austin Dobson. In his *Odes funambulesques* his muse dances on the wire that he has stretched for her with an easy assurance that evokes an amused admiration. It is the perfection of fanciful frivolity, inexhaustible in the flow of its empty gayety, "with the one idea of expressing no idea" (Lemaître), but producing the desired impression by artful interlinking of rhymes and harmonious or peculiar succession of sounds. Banville had a marvelous gift of musical speech that sings itself into the ear with a strange melody, or provokes a cynic laugh by its metallic iteration. Such art of poetry is ill-adapted to serious subjects. It closes its eyes deliberately to the sterner half of life and finds its natural element in pagan myths, renascent ideals, and bohemian manners. Of such subjects he will paint exquisite pictures, cameos whose clear-cut outlines rival the brilliancy of their color. He is the most ingrained pagan among modern French poets. Banville's *Works* are published in 8 vols. (1873-78), with a posthumous volume *Dernières poésies* (1893). He died in Paris, March 13, 1891.

BANXRING, bănks′rĭng. A Javan tree-shrew. See TREE-SHREW.

BANYAN, băn′yan or băn-yăn′ (Hind. *banya*, Beng. *baniya*, Skt. *vanij*, merchant, as the tree is used by native merchants as a market-place), also spelled BANIAN, *Ficus Benghalensis*. A tree, native of India, growing to a height of 70 to 100 feet, remarkable for its vast rooting branches. The banyan-tree is extensively planted, but occurs in a wild state only in the Lower Himalayas and the Deccan Hills. It is a species of fig (q.v.); has ovate, heart-shaped entire leaves, about 5 or 6 inches long; and produces a fruit of a rich scarlet color, not larger than a cherry, growing in pairs from the axils of the leaves. The branches send shoots downward, which, when they have rooted, become stems, the tree in this manner spreading over a great surface, and enduring for many ages. A famous banyan-tree exists in the Botanic Garden at Calcutta, India. This tree is known to be about a century old. Its main trunk is 40 feet in circumference, and there are 230 additional trunks 6 to 10 feet in circumference. One has been described as having no fewer than 350 stems, equal to large oaks, and more than 3000 smaller ones, covering a space sufficient to contain 7000 persons. The vegetation of the banyan seldom begins on the ground. The seeds are deposited by birds in the crowns of palms, and send down roots which embrace and eventually kill the palm. As the banyan gets old it breaks up into separate masses, the original trunk decaying, and the props becoming separate trunks of the different portions. The wood of the banyan is light, porous, and of no value. The bark is regarded by the Hindu physicians as a powerful tonic, and is administered in diabetes. The white glutinous juice is used to relieve toothache, and as an application to the soles of the feet when inflamed. Bird-lime is also made from it. Gum-lac is obtained in abundance from the banyan-tree. The banyan-tree is beautifully described by Southey in his poem, "The Curse of Kehama." The banyan has been successfully conveyed to other lands, fine specimens being reported in Honolulu and elsewhere. The name 'banyan-tree' is often improperly applied to *Ficus Indica*, a somewhat smaller tree.

BANYULS-SUR-MER, bȧ′nyụl′-sụr-mâr′ (Fr., little baths on the sea). A fishing port and summer resort on the Mediterranean, in the Department of Pyrénées Orientales, France (Map: France, K 9). It exports honey, oranges, and cork, and the famous Roussillon, Guenache, and Ranio wines, which are made in the neighborhood. Population, in 1896, 3119.

BANYUMAS, băn'yōō-mäs'. or **BANJUMAS** ('golden water'). A residency and a town of Java, situated on the southern coast of the island (Map: East Indies, C 6). Area of residency, 2100 square miles. Its population was 1,216,719 in 1894, including about 1000 Europeans and about 5000 Chinese. The town and seat of the Resident is situated on the river Serajo, about 22 miles inland. It has a considerable trade, and contains a population of about 9000.

BANZ, bänts (Goth. *bansts*, inclosure). A castle, belonging to one of the Bavarian princes, originally a Benedictine abbey, in Upper Franconia, Bavaria, near Lichtenfels, on the Main: situated on a mountain slope over 1400 feet high. The abbey was founded in the Eleventh Century, and celebrated for the superior culture of its monks. During the Peasants' War in the Sixteenth Century, the abbey was destroyed but immediately restored; again destroyed in the Thirty Years' War, and again restored. In 1802 it was broken up, the books and collections were scattered among German institutions, and the building turned to its present use. The castle contains a number of beautiful rooms, and also a very rare and valuable collection of petrified objects.

BAOBAB (bā'ô-bāb) **TREE.** See Adansonia.

BAOUR-LORMIAN, bȧ'ōōr'lôr'myäN', Pierre Marie François Louis (1770-1854). A French poet and dramatic author, born at Toulouse. His plays were much praised at the time of their performance, and his translations of *Tasso* (1795) and *Ossian* (1801) attracted the favor of Napoleon. In 1815 he was made a member of the Academy; but the reign of the classic style was over, and protesting to the end with feeble dialogues, *le classique et le romantique, encore un mot*, the poet found himself the butt of epigrams. Upon his death, the Academy paid him extraordinary honors.

BAPAUME, bȧ'-pōm'. The chief town of a canton, in the Department of Pas-de-Calais, France (Map: France, J 1). Population, in 1896, 3144. In August, 1793, a detachment of the Allied troops advanced to this place, after compelling the French to abandon their fortified position, and to retreat behind the Scarpe. The town was also the scene of one of the severest and most closely contested battles of the Franco-German War. It was fought January 3, 1871, both sides claiming the victory. The Germans, however, fell back behind the Somme.

BAPH'OMET. The name of a mysterious symbol, which was alleged to be in use among the Templars. According to the oldest and most probable interpretation, the word is a corruption of Mahomet, to whose faith the members of the order were accused of having a leaning. Indeed, the Old Spanish form is *Mafomat*. The symbol consisted of a small human figure cut out of stone, having two heads, male and female, with the rest of the body purely feminine. It was environed with serpents and astronomical attributes, and furnished with inscriptions for the most part in Arabic. Specimens are to be found in the archæological collections of Vienna and Weimar, and elsewhere. Joseph von Hammer-Purgstall, however, in the *Fundgruben des Orients* (Vienna, 1818), derives Baphomet from Gk. *βαφή, baphē*, baptism; and *μῆτις, mētis*, council or wisdom. He charges the knights with depraved Gnosticism, and makes the word signify the baptism of wisdom—the baptism of fire; in short, the Gnostic baptism—a species of spiritual illumination, which, however, was interpreted sensually by later Gnostics, such as the Ophites (an Egyptian sect of the Sixth Century), to whose licentious practices he declares them to have been addicted. But this explanation is generally discredited. Another explanation is that quoted by Littré from Louis Alphonse Constant (under the pseudonym Eliphas Lévi), *Dogme et rituel de la haute magie* (2d ed., Paris 1861), that Baphomet is tem[pli] o[mnium] h[ominum] p[acis] ab[bas], i.e. *tem. o. h. p. ab.*, written backward = 'abbot of the temple of peace of all men.' This seems even more strained than the other.

BAPTAN'ODON (Gk. *βάπτειν, baptein*, to dip, here referring to amphibian habits, + *ἀν, an* priv. + *ὀδούς, odous*, tooth). The only American representative of the aquatic ichthyopterygian reptiles, and a late development of the Ichthyosaurus race. The animal was fish-like in general appearance, like all the Ichthyosaurians, and was provided with paddles that were shorter and broader than those of the other members of the group. The jaws were without teeth, and this leads to the supposition that the animal fed upon the succulent plants that grew in the vicinity of its dwelling-place. It was about 10 feet long, and it lived during Middle Jurassic times in the shallow marine waters of the Colorado-Wyoming Basin. The name 'Baptanodon beds,' given by Professor Marsh to the series of rocks containing this fossil, has recently been replaced by 'Shirley Formation.' See Ichthyosaurus.

BAP'TISM (OF. *baptesme*, Gk. *βάπτισμα, baptisma*, from *βαπτίζειν, baptizein*, to dip). One of the two sacraments of the Christian Church, performed by applying water to the person of the candidate in various modes, in the name of the Trinity. Its institution is referred by the Gospels to Christ himself (Matt. xxviii. 19; Mark xvi. 16). Modern criticism has sometimes questioned the correctness of this reference, upon the ground that Christ did not concern himself with outward institutions; but there is no objective warrant for this rejection of the texts, and the immediate observance of baptism upon the beginning of the Church at Pentecost implies previous and well-understood establishment of the rite. The name and the rite were not, however, altogether new when the ordinance was instituted by Christ. The Jewish law introduced the custom of washing or baptizing proselytes upon their admission into the Jewish Church. John the Baptist baptized, not proselytes upon their renouncing heathenism, but those who by birth and descent were already members of the Jewish Church, to indicate the necessity of a purification of the soul from sin—a spiritual and not a mere outward change. There has long been much controversy as to the proper subjects of baptism, whether adults only are to be baptized upon confession of their faith in Christ, or whether their infants are also to receive the ordinance. (See Baptists; and Baptism, In-

FANT.) The general practice of the Church, Greek, Roman, and Reformed, has been to baptize infants. Another controversy of long standing has been that as to the mode of baptism, whether immersion alone constitutes valid baptism, or whether other forms may be used. Those who favor immersion argue from the meaning of the word 'baptize,' from New Testament usage, from the symbolism of the doctrine, which they think has reference to the death, burial, and resurrection of Christ (Romans vi. 3, 4), and from the acknowledged custom of the ancient and Oriental Church. Their opponents deny that the word 'baptize' is exactly and solely equivalent in the New Testament to the word immerse, dispute the definiteness of the testimony to the forms there referred to, restrict the symbolism to that of cleansing, and deny the whole cogency of the argument that apostolic example is, and was intended to be, binding upon the Church in purely formal matters. See BAPTISTS.

In the primitive Church the ordinary mode of baptism was by immersion, for which purpose *baptisteries* (q.v.) began to be erected in the Third, perhaps in the Second Century, and the sexes were usually baptized apart. But baptism was administered to sick persons by sprinkling; although doubts as to the complete efficacy of this *clinic* (sick) baptism were evidently prevalent in the time of Cyprian (middle of the Third Century). Baptism by sprinkling gradually became more prevalent; but the dispute concerning the mode of baptism became one of the irreconcilable differences between the Eastern and Western churches, the former generally adhering to the practice of immersion, whilst the latter adopted mere pouring of water on the head, or sprinkling on the face, which practice has generally prevailed since the Thirteenth Century, but not universally, for it was the ordinary practice in England before the Reformation to immerse infants, and the *fonts* (q.v.) in the churches were made large enough for this purpose. This continued also to be the practice till the reign of Elizabeth; and the change which then took place is ascribed to the English divines who had sought refuge in Geneva, and other places on the Continent, during the reign of Mary. To this day the rubric of the Church of England requires, that if the godfathers and godmothers "shall certify him that the child may well endure it," the officiating priest "shall dip it in the water discreetly and warily;" and it is only "if they shall certify that the child is weak," that "it shall suffice to pour water upon it," which, however, or sprinkling, is now the ordinary practice.

Baptism was accompanied, from an early period in the history of the Church, with various forms and ceremonies, besides the simple rite of washing with water, and the pronouncing of the formula which declares it to be "in the name of the Father, and of the Son, and of the Holy Ghost." These ceremonies are almost all retained in the Church of Rome, and also generally in the Oriental churches, but have been generally or almost entirely laid aside by Protestants. The Church of England retains the sign of the Cross made upon the forehead after baptism, but most of the other Protestant churches reject it. It was an ancient custom that the *catechumens,* as candidates for baptism were called while receiving instruction with a view to that sacrament, when they were to be baptized, publicly made a profession of their faith and a renunciation of the devil and all his works. The profession of faith is still retained by Protestant churches as the formal ground of the administration of baptism; the renunciation of the devil and his works is required by the Church of England of the person baptized, if an adult, or of the *sponsors* or 'sureties' of a child. Sponsors (q.v.) were early admitted to answer for those who could not answer for themselves, and particularly for infants. The belief in the absolute necessity of baptism to salvation led even to baptism of the dead among the Montanists in Africa, in which sponsorship was also introduced. Presbyterian and Independent churches generally reject all sponsorship, and regard the profession made by parents as simply a profession of their own faith, which entitles their infants to baptism. The ancient practice of exorcism (q.v.) immediately before baptism has been rejected as superstitious by almost all Protestant churches; as have also that of immersing three times (*trine immersion*), or sprinkling three times, with reference to the three persons of the Godhead; that of breathing upon the baptized person, to signify the expulsion of the devil, and to symbolize the gift of the Holy Spirit; that of anointing with oil (*chrism,* q.v.) to symbolize the same gift, or to indicate that the baptized person is ready, as a wrestler in the ancient games, to fight the good fight of faith; that of giving him milk and honey, in token of his spiritual youth, and of his reception of spiritual gifts and graces; that of putting a little salt into his mouth, to signify the wisdom and taste for heavenly things proper to a Christian; that of touching his nostrils and ears with spittle, to signify that his ears are to be ever open to truth, and that he should ever feel the sweet odor of truth and virtue, and that of clothing him after baptism with a white robe (the *chrysome*), in token of the innocence of soul which by baptism he was supposed to have acquired. The white robe and the anointing with oil were retained in the Church of England for a short time after the Reformation. The giving of a name in baptism, however, is no essential part of the rite, but is a custom apparently derived from that of the Jews in circumcision (Luke i. 59-63). The Church of Rome prefers the use of holy water (q.v.) in baptism, but regards any water as fit for the purpose in case of necessity. According to an ancient usage, long obsolete, the ordinary administration of baptism was limited to the two great festivals of Easter and Whitsuntide. Whether baptism may be administered in private, has been much debated, both in ancient and modern times. The administration of baptism in private houses, and not in the presence of a congregation, was one of the things earnestly contended against by the Presbyterians in Scotland in the first half of the Seventeenth Century; their opposition being grounded, not only upon hostility to what they deemed usurpation of authority, but upon the danger of superstitious views of baptism. And apparently upon this latter ground, baptism in private houses is also discouraged, even while it is allowed, if there is 'great cause and necessity,' by the Church of England; yet it has become very frequent both in the Church of England and among the Presbyterians of Scotland, and also is not uncommon in the United States. The gatherings for this purpose are often really 'christening parties,' and are festive occasions.

Although the administration of baptism is properly restricted, under ordinary circumstances, to the regular ministry of the Church, even the most rigid sacerdotal communions, like the Roman Catholic, have always held that in cases of necessity it might be administered by any one, a woman, or an unbeliever. The reason of this apparent laxity is the belief in the necessity of the ordinance to salvation. Protestant churches, which do not hold this belief, generally insist upon the participation of the ordained ministry in the ceremony, and often look with disfavor upon baptisms in private houses, or positively forbid them. But all Christians now generally hold the validity of any baptism which is seriously done in the name of the Holy Trinity.

The effect of baptism is taught by the Roman Catholic Church to consist in the forgiveness of all sins before baptism and the removal of the guilt of original sin. (See SACRAMENTS.) Some Protestant churches teach, or favor, this doctrine of baptismal regeneration. (See REGENERATION.) But the great body of the Reformed Protestant churches teach that baptism is a sign of the necessity of regenerating grace, a pledge upon the part of God to forgive the sins of the penitent, and an act of consecration and dedication upon the part of parents, and of profession of faith on the part of adults. It thus is the sign of something effected, rather than the instrument for effecting anything.

Consult: J. W. Dale's three books, *Classic Baptism* (Philadelphia, 1867), *Judaic Baptism* (1871), *Christic and Patristic Baptism* (1874), and the reply, D. B. Ford, *Studies on the Baptism Question* (Boston, 1879).

BAPTISM, INFANT. The New Testament is silent upon this subject. The biblical argument in its favor is confessedly inferential. Starting generally from the institution of the family, it points out the fact that the ancient system of the Old Testament included children with their parents in the same covenant, of which circumcision was the seal. It declares that the same essential relations of covenant remain under the New Testament. And it, therefore, argues the propriety of a similar seal, which it finds in baptism. This is, it is true, an ordinance of 'faith,' but no more so than was circumcision (Rom. iv. 11), which was indisputably applied to children. Silence about it is as natural as the long silence of the Old Testament about circumcision, whereas discussion would have been aroused if no seal of the new covenant had been provided to take the place of the old. Equally inferential is the argument against it. This starts from the proposition that baptism is a profession of faith (Acts ii. 38), and since faith is impossible to infants, denies the appropriateness of their baptism. Irenæus in the early Church gives explicit testimony of infant baptism, as does a letter of Saint Cyprian and 64 bishops in council assembled. By the time of Tertullian it was evidently in general use.

The development of infant baptism in the Church is closely connected with the development of the idea of the necessity of baptism to salvation. The Second Century generally ascribed three effects to baptism: Forgiveness of all previous sins, communication of the Holy Spirit, and the impartation of a living power carrying immortality with it. The tendency was to ascribe this efficiency to the baptism as an external transaction. Faith was not forgotten, but was left unadjusted to this really inconsistent premise. Hence the argument went unhindered forward to the assertion of baptismal regeneration. But if regeneration was effected by baptism, baptism is necessary to salvation. And hence infants, so many of whom die in infancy, must be baptized if they are to be saved. The entire Christian Church was soon united upon this reasoning.

Two tendencies were soon marked. The Greek Church emphasized more the effect of baptism upon the future, the impartation to the child of the gift of immortality, and the implanting in him of spiritual power. The Latin Church looked back rather upon the past, and hence baptism was held to effect the forgiveness of original sin.

The turning-point in the history of the subject was made by the teachings of Augustine. While there are two distinct periods in his doctrine, he is steadily more and more influenced by his doctrine of the Church. Membership in the visible Church is viewed by him as necessary to the reception of grace, and so to salvation. Therefore baptism, as the door of the Church, is necessary to salvation. It is the sacrament of regeneration. At first, Augustine taught that only actual sins were forgiven in baptism, but later he said that the guilt of original sin was also forgiven. Conversion, however, is necessary as well as baptism, and in his earlier treatises there is a degree of liberality in asserting the saving power of the former where the latter was involuntarily omitted. Later the necessity of baptism was more uncompromisingly asserted. Children must therefore be baptized, and in their case regeneration is wrought in baptism by the faith of the whole Church. While unbaptized children do not gain eternal bliss, they suffer no punishment.

At the Reformation the effort was made to extricate the doctrine from the externalism which had become fixed and intensified in the Roman Church, and to give a due place to the idea of faith. Luther held that faith was wrought in children; Melanchthon, that faith must come later to perfect the sacrament. The Anabaptists, who sought the most radical reform of the Church upon the basis of the New Testament alone, rejected infant baptism as not mentioned in Scripture and inconsistent with the requirement of faith. The same view of the subject arose among the radical element of the English Reformation, the Congregationalists, who divided in Holland upon this issue. Some of them, returning in 1611, formed the first Baptist Church in London. (See BAPTISTS.) The large extension of the Baptists in the United States and their constant exposition of their position against infant baptism has led to a considerable neglect of it in denominations that still maintain and generally practice it. The necessity of baptism to salvation is now maintained only by the Roman Catholic Church and by the sacramentarian party of the Lutheran and English churches.

Consult the books mentioned under BAPTISM, to which add the classical work W. Wall, *History of Infant Baptism* (n.e. Oxford, 1862, 2 vols.).

BAPTISM BY HER'ETICS. See HERETIC BAPTISM.

BAPTISM WITH THE HO′LY SPIR′IT. A figurative expression for an accession of spiritual power as the direct operation of the Holy Spirit.

BAP′TISTERY (Gk. *βαπτιστήριον, baptistērion,* bathing-place). A place where baptism is administered. A term used to designate a separate building, or the annex or part of the church used for that purpose, or even the baptismal font. As immersion was the method in use until the close of the Middle Ages, a large basin or tank and a separate building were required during all these centuries. In the Apostolic Age, it is true, converts were usually baptized in the nearest running water, and this remained permissible for a long time—as in Charlemagne's wholesale baptism of the Saxons and in most early missionary work. But as early as the Second Century, Christian ritual required a separate building attached to an episcopal church for the celebration of the ceremony, for it was connected with the abjuration of error and the hearing of mass. Baptisteries were of a well-defined form: their prototypes are the *frigidarium* in some of the smaller and private Roman baths, as at Pompeii and Stabiæ, which were circular rooms with a *piscina* or *baptisterium* in the centre; this central tank, also called *piscina* by Christian writers, was usually octagonal in form in the baptisteries and entered by a descent of several steps (usually three) from the floor level. The earliest baptisteries preserved are in the Roman Catacombs (q.v.), supplied by natural springs, and these were used during the persecutions; the best known is that of the Catacomb of Pontianus (Third Century). In the Fourth Century, beginning with Constantine, many large baptisteries were erected. As they were not allowed except in episcopal towns (and even there only one was allowed, in connection with the cathedral church), as, besides, the rite of baptism was administered ordinarily only at certain seasons—Easter, Pentecost, and Epiphany—the baptisteries had to be so large that several thousand persons might be baptized on each occasion. These baptisteries were concentric in form; that is, an octagon, either inscribed in a square or free-standing, or, more rarely, a rotunda, a blunt cross, or a hexagon. They were placed close to the church and connected with it, sometimes in front of the atrium, either on its central axis (Parenzo), or to one side (Torcello). The main hall, with the *piscina* or *fons* in its centre, was usually preceded by a closed *portico* (Aquileia, Lateran), where the ceremony of the Confession of Faith took place, and contained an altar, often placed in a special apse, for services to follow the baptism. The baptistery was, therefore, a church. It was commonly dedicated to Saint John the Baptist. The baptismal basin itself was surrounded by a line of columns, sometimes connected by an architrave, between which hangings were drawn which concealed from the crowd the actual scene of baptism. Above this central section usually rose a dome of masonry or wood—circular or polygonal. Around it was often an encircling aisle—sometimes two aisles—to accommodate the crowd. Early writers describe the magnificent decorations and furnishings of the baptisteries. That of Saint John Lateran is said to be by Constantine, and is certainly not much later. It is an octagon, with an interior 69 feet wide, divided by eight columns into a centre and an ambulatory which is unique in being surmounted by a gallery. But in more unchanged condition is the contemporary (c.420) baptistery of the Cathedral of Ravenna, an octagon inscribed in a square, whose walls and dome are completely covered with a wonderful decoration of mosaics, stuccoes, and marble slabs, which is one of the most perfect specimens of Early Christian art. Somewhat later the Arian heretics built a baptistery for themselves (c.500) in Ravenna, on a similar plan. Several ruined baptisteries have been found connected with the interesting churches of the ruined cities of Syria, all of them of the Fourth, Fifth, and Sixth centuries. That at Kalat-Seman is unique, not only in its four porticoes and four chambers symmetrically grouped around it, but in being set beside a small baptismal church, of basilical form. Of circular baptisteries, the most important is that at Nocera (Fifth Century) in Southern Italy, measuring 70 feet inner diameter, with a peculiar brick dome supported on fifteen pair of coupled columns and surrounded by a vaulted aisle. The Church of Saint Costanza, in Rome, similar to this and by many still regarded as a baptistery, was really the mausoleum of Constantina, the daughter of Constantine. The *piscina* at Nocera is unusually well preserved; it is 20 feet wide and 5 feet deep, with two descending steps, a parapet with marble slabs, and eight surrounding columns for the hangings. Other interesting early examples are at Aquileia, Der-seta and Mondjelera in Syria, Albenga, Gravedona, and Sant' Aquilino, at Milan. Italy and the Orient alone have such early examples. The period of decline from the Seventh to the Tenth centuries shows few of any importance. France has two examples at Fréjus and Poitiers. In the Eleventh Century the revival of architecture in Europe led to the building of superb baptisteries in Italy, but not elsewhere. Every free Italian commune had in its main square the group of three great religious structures—cathedral, tower, baptistery. The three most impressive of these groups are at Parma, Pisa, and Florence: others are at Pistoja, Novara, Cremona, Verona, Lucca, Volterra, and Siena. Baptisteries of this period—Eleventh, Twelfth, and Thirteenth centuries—are especially numerous in northern Italy; besides the above, there are others at Almenso, Casale Monferrato, Bologna (San Stefano), Ascoli, Serravalle, Asti, and many more, while the south is represented only by Ruvo and Bari. Of all these baptisteries, that of Florence is the most noted for its internal decoration in mosaic and for its fine dome, its marble figured pavement, and its wonderful bronze doors by Andrea Pisano and Ghiberto. That of Pisa contains Niccolò Pisano's famous pulpit. The Parma baptistery is entirely filled with contemporary frescoes and sculptures. All three are exquisitely finished on the exterior with different colored marble incrustations, architectural details, and sculptures. In some cases the dome that surmounts the baptistery is allowed to show its outline on the exterior (Florence); in other cases a straight wall is continued from the base of the dome to a height that entirely conceals it (Parma). The largest of these mediæval baptisteries far surpass the earlier examples in size, and could hold large congregations. Besides such separate structures, there were cases where a part of the church itself was used for baptism, either in the form of a projecting chapel or of one forming a part of the regular plan. Such chapels were usually near the entrance, opening either on the narthex (q v.) or on the interior. Such is the baptismal chapel opening out of the inner right-hand narthex at Saint Mark's, Venice.

Before the Renaissance, however, the change in ritual from immersion to affusion and aspersion only made separate buildings unnecessary. The simpler rite could be performed in the church itself, and all that was required was a large holy-water vase. Renaissance artists executed many exquisite works of this sort during the Fifteenth and Sixteenth centuries. These works had been preceded by large sculptured immersion basins, as at San Frediano, Lucca, which had succeeded the simpler early tanks. See BAPTISM.

BAP'TISTS (Gk. βαπτίζειν, *baptizein*, to dip in water, baptize). A name first given in 1644 to certain congregations of English Separatists, who had recently restored the ancient practice of immersion. These congregations were the first in modern times to maintain that immersion is essential to valid baptism; other bodies had practiced immersion, but without such teaching. The prominence assumed by the doctrine of baptism among the Baptists was due to the opposition of the other English churches to their practice. Immersion was denounced as newfangled, unnecessary, immodest, dangerous to health, etc. Naturally, Baptists retorted that immersion was indispensable. When the Continental Anabaptists had practiced immersion, no one had opposed their practice vehemently, and they were not tempted, therefore, to give special emphasis to its necessity. In general characteristics of doctrine and polity, the English Baptists were agreed with the more sober and evangelical groups of Anabaptists, and with the Mennonites. They held that loyalty to Christ and His teachings is the supreme duty of Christians; that these teachings are contained in the Scriptures, which are thus the sole and authoritative rule of faith and practice; that the religion of Christ is spiritual, and none can enter the kingdom of heaven, or should enter the Church on earth, unless he has been born anew of the Spirit of God; that only those should be baptized, therefore, who make personal profession of faith in Christ and give credible evidence of regeneration; that a true Christian Church is the fellowship of such baptized believers; that each Church has Christ as sole Head and Lawgiver; that no secular power should interfere with the spiritual interests of any believer or of any Church. These tenets are not accidentally associated, but constitute a logically compact series, each member of which is necessary to the full validity of the rest. All Baptist churches have been and are agreed in holding them, whatever their differences on other points.

From the first there were two main bodies among the English Baptists, distinguished by their adoption of the theology of Arminius or of Calvin. The Arminian or General Baptists originated first. About 1606 a congregation of Separatists at Gainsborough fled to Holland to escape persecution, and established themselves at Amsterdam. Their leader, John Smyth, had been a clergyman of the Church of England; now his contact with the followers of Arminius and with the Mennonites led him to the adoption of many new opinions. He became convinced that infant baptism is not warranted by the Scriptures, and he therefore baptized himself, no doubt by affusion. Several of his followers joined him, and a new church was organized, practicing the baptism of believers only. Smyth soon withdrew from the Church, but others held to their faith, and, returning to England in 1611, established the first General Baptist Church in London. By 1626 there were 5 such churches in England, and by 1644 they had increased to 47.

The Calvinistic or Particular Baptists sprang from a congregation of Separatists, established in London in 1616. In 1633 some members of this congregation, who opposed the baptism of infants, peaceably separated from the main body, a part of them receiving a new baptism; and soon afterwards John Spilsbury became the pastor of this new congregation. In 1640 a further division in the original Church occurred by mutual consent, and some of those composing one of the new congregations soon became convinced that immersion is the true Scriptural baptism. Knowing none in England who practiced such baptism, they sent one of their number, Richard Blount, to Holland. There was at Rynsburg a Collegiant Church of Mennonites, who had adopted immersion in 1619 (probably having received it from the Polish Anabaptists, who had possibly derived their practice from some of the Swiss Anabaptists). Having been baptized by them, Blount returned to England, and began the administration of the new baptism in 1641. The Spilsbury people seem to have disliked this method, which they considered a vain search after a baptismal 'succession,' and about the same time adopted the practice of immersion *de novo*. As their pastor pithily remarked, "Where there is a beginning, some must be first." In 1644 seven churches of the Calvinistic order united in a Confession of Faith, being joined also by one French congregation, in which baptism was for the first time defined as 'dipping' or 'plunging.' The General Baptist churches gradually adopted the same practice, though some of them continued the use of affusion as late as 1653.

During the period of the Civil War and the Commonwealth, the Baptist churches received a practically full toleration, and increased with great rapidity. This was especially true of the Particular Baptists, who were in closest sympathy with Puritan movement. At the time of the Restoration (1660), the General Baptists claimed to have 20,000 members, whence it may be fairly estimated that there were fully 50,000 Baptists in all at that time. The services of these churches to the cause of English liberty, civil and religious, were heartily recognized. Several of Cromwell's highest officers were Baptists; some of the most popular preachers of the time were of the same faith; others, like John Milton, avowed Baptist sentiments, but never were connected with the churches. A few so far forgot their principles as to accept livings in the Established Church, and were even members of Cromwell's Triers, or commission of visitation for the setting in order of the parishes. The great majority, however, remained faithful to their contention, from the first, that the Church as a spiritual body should be entirely separate from the State, and that complete religious liberty should be given to all, even to Roman Catholics and Jews. It required two centuries for England to approximate the adoption of this Baptist programme. After the Restoration the Baptists were severely persecuted, the Conventicle and Five-Mile acts being strictly enforced against them. The well-known prolonged imprisonment of John Bunyan is the most conspicuous instance. Some proved more pliable than he, and by promise of silence obtained their release; some, like Hanserd Knollys, were in prison many times; others, like William Kiffen, enjoyed the royal favor and escaped with comparative immunity. Under these persecutions the Baptists declined in numbers, and the Revolution (1688) found them greatly depleted and discouraged. The Act of Toleration secured them from further persecution, but for a whole century thereafter their progress was very slow. A convention of the Particular Baptists, held in 1689, and representing over 100 churches, published what remained for generations their recognized standard of doctrine and practice. It was in the main a readoption of the Westminster Confession, and differed from the Confession of 1644 chiefly in being silent on the question of baptism (immersion) before communion. Until the great Wesleyan revival, in the middle part of the Eighteenth Century, there was no further progress among the English Baptists. Among the Particular churches a form of hyper-Calvinism was common, which prohibited more than the preaching of the law to the unconverted, and discouraged all direct appeals to men to accept Christ as their Saviour. The result was paralysis to most churches, and death to not a few. Among the General Baptists, Socinian views made rapid progress, and in the end a large part of their churches became Unitarian. The Wesleyan revival greatly affected the Baptist churches. A more evangelical type of preaching was revived in both wings of the denomination. Under the leadership of Dan Taylor, a converted miner, the New Connection of General Baptists was organized, and became a flourishing and influential body. But the most important result of this new quickening of spiritual life was the undertaking of work in foreign missions, under the leadership of William Carey. The English Baptist Missionary Society was organized October 2, 1792, and the following year Carey was able to begin his labors in India. At his death, in 1834, not only had many converts been made, but versions of the Scriptures had been issued under his supervision in 40 different dialects, spoken by one-third of the people in the world; and 212,000 copies of these versions had been printed. The great increase of the modern missionary cause is directly traceable to the work of Carey and the English Baptists. The reflex influence of this missionary enterprise upon the English Baptists themselves is equally remarkable. More than 100 new churches were organized in the last two decades of the Eighteenth Century—nearly equaling the increase of the entire century preceding this time—while in the first half of the Nineteenth Century 700 new churches were constituted. The most important step in the unification of the English Baptists was the formation of the Baptist Union, in 1832. Into this all the various societies for missionary and educational purposes have been merged; and, finally, in 1891, the long-separated General and Particular Baptists became one body. Of the men whom these churches have produced during the last hundred years three stand forth preëminent: Andrew Fuller (1754-1815), Robert Hall (1764-1831), and Charles Haddon Spurgeon (1834-92).

The first Baptist church in Wales of which record remains was formed at or near Swansea, in 1649. The growth of Baptists in that principality was greatly promoted by the labors of Vavasor Powell, who was baptized about 1655, and thereafter preached throughout the land, establishing 22 churches, some of which had several hundred members. The progress of Baptist churches in Wales was steady but slow until 1800. Of the 821 Welsh churches now in existence, 640 were founded in the Nineteenth Century. Until lately these churches have belonged to the strict communion wing; in recent years, some of the city and town churches have adopted 'open' principles.

The first Baptist church in Scotland was founded in Caithnesshire in 1750, but progress was very slow until Archibald McLean and the Haldane brothers began their work as evangelists—the first quarter of the last century. Scotland is naturally Presbyterian, and the growth of Baptist churches has been very slow, an average of 10 to the decade for the last hundred years. Ireland has also been an unpromising field. The oldest church dates from 1653. Two-thirds of the existing churches have been established since 1850.

Baptists in America. There were among the early colonists those who held Baptist views, but the first church established was at Providence, R. I. Roger Williams, a minister of the Church of England, but an advanced Puritan, on coming to the Colony of Massachusetts, became almost at once a disturbing element there, by his advocacy of notions that the authorities of that colony were not disposed to tolerate. He was condemned to banishment, October 8, 1635, and, to escape being deported to England, made his way through the wilderness in midwinter, bought land of the Narragansett Indians, and founded the Colony of Providence, on the principle of complete civil and religious liberty. His study of the Scriptures convinced him that only believers are fit subjects of baptism, and others of the little colony had come by March, 1639, to hold similar opinions. No minister being within call, this little band of twelve believers decided to originate baptism; one of their number, Ezekiel Holliman, baptized Williams, and he baptized the rest. In the following year, probably, another Baptist church was formed in the neighboring Colony of Newport. A company of Welsh Baptists emigrated in 1665 and established themselves in the Colony of Massachusetts, settling after some vicissitudes at Rehoboth, in 1667. A Baptist church was formed in Boston in 1655, and in spite of severe persecutions succeeded in maintaining itself there. Until 1691 the Baptists of Massachusetts experienced repeated and severe persecutions—fines and imprisonments and whippings—and it was not until 1833 that they ceased to be taxed for the support of a State Church. Up to the Great Awakening (1750), there were but eight Baptist churches in this region.

A group of churches, established a little later than these in the New England region, became the most influential centre for the propagation of Baptist ideas. In 1688 a Baptist church was formed at Pennepek, or Lower Dublin, now a part of Philadelphia, and in the same year another church was organized at Middletown, N. J. Twelve such churches were in existence by 1770. The constituent members of these churches were English and Welsh Baptists, of the Calvinistic wing, and the establishment of the Philadelphia Association in 1707 made them the most compact and influential body of Baptists in America. Most of the churches of New York Colony, as they were constituted from 1712 onward, sought admission to this association, which also contained members in Virginia and the Carolinas, as far south as Charleston. The adoption of a Confession before 1742, ever since known as the Philadelphia Confession, furnished a standard of doctrine that has endured to the present day, and multiplied the influence of this association.

From these two centres the extension of Baptist churches slowly proceeded until the Great Awakening, when new life and vigor was infused into the movement, and the progress of Baptists in all the colonies became relatively rapid. This progress was not seriously checked even by the Revolution, save in certain localities. There were probably no more than 10,000 members in the Baptist churches existing at the outbreak of that struggle; but a careful estimate made in 1792 (an enumeration. in large part) put the number of members at 35,000, and at the close of the century the Philadelphia Association stated the number at 100,000, distributed among 1200 churches. The great westward movement of the population after the Revolution was the opportunity of the Baptists, and they promptly improved it. The churches and associations on the borders of the new country sent missionary preachers into the new settlements, and gradually local societies were formed for this work. This led to the organization of State missionary conventions, and in 1832 to the formation of a national organization, the American Baptist Home Mission Society, which now sustains over 1000 workers at a cost of more than half a million dollars a year. In 1813 a society for foreign missions was formed, called 'The General Convention of the Baptist Denomination in the United States,' which continued to be the general agent of the churches for this work until 1845, when differences between the Northern and Southern churches concerning slavery produced a division. The Southern churches formed 'The Southern Baptist Convention,' which has continued until the present time to be their missionary agency; while the Northern churches organized 'The American Baptist Missionary Union.' The American Baptist Publication Society—beginning merely as a tract society in 1824, but since 1840 a great denominational publishing agency—completes the national organizations.

The progress of American Baptists during the Nineteenth Century was very rapid, in spite of many controversies and schisms that divided their forces and lessened their numbers. The most serious of these schisms was that resulting in the establishment of the Disciples as a separate body, beginning about 1815 among the churches of western Pennsylvania and Ohio. This controversy extended throughout the region of the Central West, and had disastrous effects. Less serious was the division among the Eastern and Southern churches from 1835 onward on the issue whether missionary societies, Sunday-schools, and other similar agencies for Christian work are authorized by the Scriptures. The establishment of the Old School or Primitive Baptists was the result. Aside from their rapid numerical progress, the educational work of American Baptists is the most striking feature of their history. Their first educational institution was an academy at Hopewell, N. J., which began in 1756, but was brought to an end by the Revolution. The Philadelphia Association began to plan for a college as early as 1750, and to the efforts of this body was due the chartering of Brown University (as Rhode Island College) in 1764. Waterville (now Colby) College was founded in Maine in 1818, and a literary and theological institution (now Colgate University) was begun at Hamilton, N. Y., in 1820. From this time on the number of colleges and theological seminaries multiplied, at times far in excess of the needs of the denomination or its ability to support them, until the closing century saw the Baptists in possession of 7 theological schools, 105 schools of collegiate grade, and 90 academies. These schools possess property valued at $44,000,000, of which fully half is productive endowment.

Baptist Theological Seminaries. In the order of their foundation, these are as follows: (1) The Hamilton, established at Hamilton, N.Y., in 1819, by the Baptist Education Society of the State of New York, as 'The Hamilton Literary and Theological Institution.' In 1846 the literary department was chartered as Madison University (since 1889 Colgate), and in 1893 the university took control of the seminary. (2) The Newton Theological Institution, established at Newton Centre, Mass., in 1825, by the Massachusetts Baptist Education Society. (3) The Rochester, established at Rochester, N. Y., in 1850, by the New York Baptist Union for Ministerial Education. A German department was added in 1852. (4) The Southern, established at Greenville, S. C., in 1859; interrupted by the Civil War, the sessions were resumed in 1865, and in 1877 it was removed to Louisville, Ky. (5) The Divinity School of the University of Chicago, established in Chicago in 1867 by the Baptist Theological Union for the Northwest, as the 'Baptist Union Theological Seminary'; in 1877 removed to Morgan Park, and in 1890 returned to Chicago and consolidated with the new university. In 1873 a Scandinavian department was added. (6) The Richmond, established in 1867 at Richmond, Va., by the American Baptist Home Ministry for the education of negro young men for the ministry. (7) The Crozer, established at Upland, Pa., in 1868, by the family of John P. Crozer.

The Baptist Church in Other Countries. The earliest Baptist churches in the *Canadian* Provinces were formed of settlers from New England. A church was founded at Horton, Nova Scotia, in 1763; but this and many of the earlier churches were of mixed membership, composed equally of Baptists and Congregationalists. The preaching of Henry Allcine, an evangelist of great gifts, resulted in the founding of many churches from 1775 onward. Baptist preachers from Vermont began soon after the Revolution to make converts and form churches across the line; and in a similar way, churches sprang up along the shore of Lake Ontario, in Upper Canada. A considerable number of Scotch immigrants settled in the Ottawa region, and the churches there trace their origin to the labors of the Haldane brothers. The first association was formed in 1800 by the churches of Nova Scotia and New Brunswick, and a missionary society was formed as early as 1815 in the same region. Other societies followed, but in 1888 they were all consolidated in the 'Baptist Convention of Ontario and Quebec.' Five boards conduct the various branches of work that were formerly apportioned among as many different societies. In proportion to their number and means, Canadian Baptists have also been active in educational work. Acadia College was founded in 1838, Woodstock College in 1860, and McMaster University, at Toronto, in 1880. The latter institution was begun as a theological school, but soon afterwards an arts department was added, and later still Moulton College, for young women, was affiliated with it.

The Baptists in *France* owe their origin to a mission established in that country in 1832 by the Triennial Convention of American Baptists. Progress was slow for many years, owing to persecutions and other difficulties; but in later years growth has been steady and sure. The establishment of a theological school in 1879, by the aid of their American brethren, has done much to promote the welfare of French Baptists. For many years the work has been left wholly to native preachers.

The founder of the *German* Baptist churches, Johann Gerhard Oncken, had come by study of the Scriptures to such views of doctrine and practice as are everywhere held by Baptists, without any knowledge on his part that there were such people in existence. In 1834 he and six others were baptized at Hamburg by Rev. Barnas Sears, an American Baptist then pursuing studies in Germany, and so the first German Baptist church was established. In spite of severe persecutions, the progress of this work was rapid almost from the first, and has gone on with ever-accelerating momentum. A publishing house was started in 1828, and a theological school was opened in 1880; both have been and are flourishing institutions. In 1849 the associations previously existing were combined to form the 'German Baptist Union,' which, not content with fostering the work at home, has been an active missionary body. Germans have preached and gathered converts in Denmark, Finland, Poland, Holland, Switzerland, Russia, Hungary, Bulgaria, and Africa, until the numbers in these missionary churches equal those in Germany itself.

The work of Baptists was begun in *Sweden* by two sailors, natives of that country—Gustaf W. Schroeder, who was baptized in New York in 1844, and Frederick O. Nilsson, baptized at Hamburg by Oncken in 1847. Andreas Wiberg was a worthy third in this field. Opposition by the State Church and repeated fines and imprisonments did not deter these preachers from carrying on their work, and the progress of the Baptist churches was rapid. The numerical results would be much larger but for the fact that a good proportion of the converts made have emigrated to the United States. A theological school established in 1866 has done much to further the work of the Swedish Baptists. From Sweden the work has extended into *Norway* also.

With one exception the Baptist churches of *Africa* are of missionary origin. The Baptists of the Cape colonies owe their beginnings to English Baptist immigrants, and their earliest church was formed in 1820. For another half-century their progress was very slow; but the last two decades have seen a great advance, 18 of their 25 churches having been constituted since 1880. A missionary society sustains 4 mission stations among the natives, and a Baptist Union, formed in 1877, promotes the interests of all the churches. In Central Africa, in the Congo region, American Baptists have a flourishing mission with 8 stations. The English Baptists maintain a similar work on a still larger scale, having 12 mission stations. The Southern Baptist Convention has a mission with 5 stations on the West Coast.

The Baptists in *Asia* are wholly of missionary origin. The oldest mission is that begun by Carey and the English Baptists in India proper, and since extended to Ceylon. The Australian Baptists have joined in this work, and have taken Eastern Bengal as their especial field. American and Canadian Baptists maintain missions in Southern India, among the Telugu people. The oldest American mission, however, is that in Burma, and gradually the work has been extended to Assam, Siam, China, and Japan. The Southern Baptists have a mission also in western China. The Asiatic missions of the various Baptist societies have been the most fruitful in the history of modern missions.

The last century has produced considerable change in the doctrines and practices of Baptists, but most of these are such as they have shared with all other bodies. They are no longer rigid Calvinists, though the general type of theology is distinctly Calvinistic. Strict communion is yet the prevalent theory among them, but there is little enforcement of it in practice, except in the Southern States, though there is also little direct encouragement of 'open' communion. Baptist churches have never had a heresy trial, and for more than 50 years a schism has been unknown among them. In polity they are Congregational.

Baptists began the Twentieth Century with the following membership, including only what are sometimes called the 'regular' Baptists: In the United States, 4,376,666; in Canada, 100,264; in the Spanish-American countries, 3877; in Great Britain, 365,300; in Europe, 123,569; in Asia, 119,795; in Africa, 6700; in Australasia, 19,261. Altogether they number over 5,000,000. Increase during the last decade throughout the world, 1,219,802.

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Baptist Church of Christ. A denomination that originated in Tennessee, where the oldest congregations were formed about 1808. They have spread to six other States, all of them in the South. Their belief is a modified Calvinism, which makes room for a general atonement; they practice feet-washing as a religious ordinance. The census of 1890 gave them 152 churches and 8254 members.

Baptists, Free-will, correspond in doctrine and practice to the General Baptists of England, but originated in this country. There are two distinct bodies known by this name. The older arose in North Carolina, and formed an association in 1729. Some of these afterwards joined the regular Calvinistic churches of the region, and those who remained true to their first principles were popularly called 'Freewillers.' This nickname was finally accepted by them; but later, to distinguish themselves from others, they took the name Original Freewill Baptists. They differ from the regular Baptist bodies mainly in practicing feet-washing and anointing the sick with oil. In 1890 they had 167 churches and 11,864 members, found only in the two Carolinas.

The larger and better-known body arose in New Hampshire. Benjamin Randall, a convert of the Whitefield revival, was practically though not formally excluded from fellowship because he did not believe and preach the doctrine of election. A church believing in free grace was organized in New Durham, N. H., in 1780, and Randall was ordained to the ministry. The strength of the denomination has from the first been in New England, but it has made considerable progress in the Central West. In 1827 a general conference was formed, at first meeting biennially, but of late years triennially. In 1841 the Free Communion Baptists (a body that originated among the Separates, or churches that sprang up as a result of the Whitefield revivals) united with them. The Freewill Baptists bore emphatic testimony against slavery, especially in 1845; and declined overtures for union with certain Baptists of Kentucky, because the latter defended slavery. The Foreign Mission Society of the denomination was organized in 1833, and a home mission society in 1834. They sustain a college at Lewiston, Me.; Hillsdale College, Michigan; theological seminaries at Lewiston, Me., and Hillsdale, Mich., and several academies. The official name was changed some years ago to Free Baptists, and the older name is going out of use. Overtures have been made for the union of the body with the regular Baptists, and also with the Disciples, but thus far nothing has come of them. They now report 1318 churches and 86,255 members, having slightly increased in membership during the last decade. See Stewart, *History of the Freewill Baptists* (Dover, N. H., 1862); J. J. Butler, *Christian Theology* (1861).

Baptists, Old School or Primitive, also known as Anti-Mission, and popularly called 'Hardshell.' A denomination whose members claim to be the original Baptists, from whose principles and practices all others have departed. In fact, this body originated about 1835 in an organized opposition to missionary societies, Sunday-schools, etc. This opposition really grew out of the hyper-Calvinistic theology held by some of the Baptist churches, and these human societies were held by them to make the salvation of men depend rather upon human effort than on divine grace. They do not believe in a paid or educated ministry, and sustain no colleges or theological seminaries. They were at one time quite numerous in the Middle States, but are now strongest in the mountain districts of North Carolina, Tennessee, and Georgia. It is difficult to say whether they are decreasing or diminishing, since adequate statistical information is not to be had. The census of 1900, the first and only careful enumeration of them, gave them 3222 churches and 121,347 members.

Baptists, Seventh-Day, as their name indicates, are distinguished from others mainly by their observance of the seventh day instead of the first as the Christian day of worship. They hold that the literal observance of the Fourth Commandment has never lost its obligation, and maintain that the early Christians observed the Sabbath. The first church of this order was founded in the Mill Yard, London, in 1676, by Rev. Francis Bampfield, a graduate of Oxford, and prebendary of Exeter Cathedral. This church still survives, but others founded in the Seventeenth and Eighteenth centuries have become extinct. The first American church had an independent origin, being founded by Stephen Mumford, at Newport, R. I., in 1671. In this country they have increased steadily though not rapidly, and are active in the propagation of their principles through tracts and books. In 1842 they formed a foreign missionary society, which has its headquarters at Westerly, R. I., and they support a tract and publishing house at Plainfield, N. J. They have a college at Alfred Centre, N. Y., and another at Milton, Wis., besides an academy at Salem, W. Va. They report 115 churches and 8991 members, distributed through 24 States—a decrease of about 1000 members in the last decade.

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Baptists, German Seventh-Day. A body confined to Pennsylvania, where it originated. The first church was founded at Germantown in 1728 by Conrad Beissel, and was an offshoot of the Dunkards. Under the leadership of the founder they established a colony at Ephrata, near Lancaster, where they lived a very austere community life. They spread to several of the adjacent counties, and there are now six congregations of this order. For the early history, see the *Chronicon Ephratense.*

Baptists, Six-Principle, originated as a separate body in 1690, when five London churches, dissatisfied with the Baptist Confession of the previous year, met and formed an assembly of their own, on the basis of the six principles enumerated in Heb. vi. 1-2: Repentance, faith, baptism, laying on of hands, the resurrection of the dead, eternal life. In fact, they differed only on the question of laying hands immediately on all baptized persons. They were composed of both Calvinistic and Arminian Baptists, but the former withdrew after a time, and the remainder became absorbed into the General Baptists. Six-Principle Baptists existed in Rhode Island from the foundation of the first Baptist church in Providence, some of the founders having been of that persuasion. This church was divided on this issue in 1653, and the Calvinistic half became extinct. In 1771 the surviving Six-Principle wing, which until then had been Arminian in belief, was persuaded by Rev. James Manning, then its pastor as well as the president of Rhode Island College, to adopt a Calvinistic Confession. The churches of this order are confined to New England, and are gradually becoming extinct. There are no statistics later than the census of 1890, which assigns them 18 churches and 937 members.

Baptists, United. The name taken on their union by Baptist churches in the South once known as 'Old Lights,' and 'Separates' or 'New Lights.' The division arose in consequence of the Whitefield revival, and was common to several denominations in the seaboard States. Most of the United Baptists came into full fellowship with other (regular) Baptists, with or without dropping the name; but in five Southern States they still maintain not only the name, but a separate organization. They have 204 churches and 13,209 members, according to the census of 1890, the latest statistics available.

Baptists, Two-Seed-in-the-Spirit, a small body, extremely Calvinistic, owing their rise to certain theological vagaries of Elder Daniel Parker, a Baptist preacher of Tennessee from 1806 to 1836. It was sought to explain the doctrine of election by speculation of a Manichæan nature, the gist of which was that some of Eve's offspring were the seed of God, and so elect to eternal life; while some, corrupted by Satan, were his seed and foreordained to the kingdom of eternal darkness. They incline toward Antinomianism, object to a paid ministry, and agree with the Primitive Baptists in reprobating 'modern institutions.' Their strength is in Kentucky, Arkansas, and Texas, though they are found also in 21 other States. In 1890 they had 473 churches and 12,851 members.

BAPTIST YOUNG PEO′PLE'S UN′ION OF AMER′ICA. A society organized in Chicago in 1891. It has its headquarters in Chicago, and publishes a weekly paper, *The Baptist Union.* It numbered in 1900 about 500,000 members. See L. W. Bacon and C. A. Northrop, *Young People's Societies* (New York, 1900).

BAR. A town in the Government of Podolia, Russia, on a tributary of the Bug, 106 miles northeast of Kamenetz-Podolsk (Map: Russia, C 5). It is a town of wooden houses. Brick-making, leather-dressing, and distilling are among its industries, and a trade in grain is carried on. Eleven fairs are held annually. Population, in 1885, 13,434; in 1897, 10,614. The 'Confederacy of Bar,' under the leadership of Krasinski and Pulaski, was formed here, February 9, 1768, with the object of maintaining the independence of Poland and checking the growth of Russian influence.

BAR. In hydrography, a bank or shoal formed by the deposition of sand and silt from water. Bars frequently occur at the mouth of a river where the outflowing water with suspended mud is checked in its motion by the sea, the coarser material thus having a chance to sink to the bottom. The sand along the bank of a river, carried to its mouth by the wind and the water, and the sand that is carried inward from the sea by the tidal waves, also contribute to the formation of bars. When the river cuts its way through the obstructing mass at its mouth a delta may be formed. The decreased velocity of current in portions of a river channel gives rise to bars, which are subject to removals and rebuildings, and are capable of causing continual shifting of the river channels. The Mississippi in America, the lower course of the Rhine in Europe, and the Hoang-ho in China, present excellent examples of this phenomenon. Bars also form along seacoasts that are swept by tidal currents wherever there is sufficient decrease of velocity to allow a deposition of silt. They occur here as barriers, often of considerable extent, which are separated from the shore by lagoons of salt or brackish water. See Harbor; Delta; Jetty; and River.

BAR. In the mechanical arts, any elongated piece of metal, wood, or other substance of a regular section used for mechanical purposes, as the bar of a capstan or press, the bars of a grate, the bars of a fence, gate, doors, or windows. Metal bars are usually manufactured by rolling or forging. See Forge, Forging; and Rolling Mill.

BAR, in Music. A vertical line drawn across the stave to divide a musical composition into portions of equal duration, and to indicate the accent, which usually falls on the note immediately following. Each of these small portions, called *Measures*, is also popularly termed a bar. The use of the bar dates from the Fifteenth Century. A double bar formed of two parallel vertical lines is always placed at the end of a composition or of a section thereof. Sometimes at the close of a section it is accompanied by dots, showing that a certain portion is to be played again. See Measure.

BAR. In heraldry (q.v.), one of the charges known as *ordinaries.*

BAR. In law, a term originally applied to the rail which separated the court officials from the suitors, their advocates, and friends. When an action was brought to trial the suitors presented themselves at the bar, accompanied by their advocates, who addressed the court from that position. Hence the secondary signification of the term, as denoting those whose profession it is to appear at the bar on behalf of suitors. From the word, in this sense, comes barrister (q.v.). See also Advocate; and Attorney.

Bar, Plea in, is a plea or defense, which, if supported by evidence, forms a conclusive answer to an action, such as a traverse, or denial, of all the allegations upon which a civil action or criminal prosecution is based. See Plea.

Bar, Trial at. Formerly a trial before all of the judges of a superior court in England.

Bar Associations are voluntary organizations or unions of lawyers, having for their primary object the elevation of the bar. Some of them are local, and, to an extent, coöperative. Such is the 'Association of the Bar of the City of New York.' Its active membership is limited to lawyers residing or practicing in the city of New York, and it maintains a fine law library and building for the use of its members. It was established, however, not simply as a social club, nor as a library association, but "to maintain the honor and dignity of the profession of the law, and to increase its usefulness in promoting the due administration of justice." There are also State bar associations, whose membership is limited to the lawyers of a particular State. On the other hand, to the American Bar Association any person is eligible who has been a member in good standing of the bar of any State for five years. The object of this organization is declared in its constitution to be "to advance the science of jurisprudence, promote the administration of justice and uniformity of legislation throughout the Union, uphold the honor of the profession of the law, and encourage cordial intercourse among the members of the American Bar." It has a membership of nearly 2000, and is exercising a powerful influence in many ways. It has done much to elevate the standard of legal education and to promote uniformity in State legislation upon various subjects.

Bar Council. A body of elected barristers (q.v.) supported by the four Inns of Court (q.v.) as the voluntary representatives of the entire English bar, charged with the duty of dealing with all matters affecting the profession. They have no disciplinary authority, but they exercise a strong moral influence as guardians of professional etiquette, and, in connection with the Attorney-General and benchers of the Four Inns, may secure the punishment of barristers who are guilty of misconduct.

BAR, Karl Ludwig von (1836—). A German jurist, born at Hanover, and educated at the universities of Göttingen and Berlin. Both as a member of the Reichstag (1890-93) and in his capacity of jurist, he strongly advocated the introduction of publicity and of more humane procedure in criminal cases. His important works are: *Das internationale Privat- und Strafrecht* (1862; 2d ed., 2 vols., 1889); *Die Redefreiheit der Mitglieder gesetzgebender Versammlungen* (1868); *Die Lehre vom Kausalzusammenhange im Rechte* (ib., 1871); *Das deutsche Reichsgericht* (1875); *Staat und katholische Kirche in Preussen* (1883).

BARA, bä′rȧ, Jules (1835-1900). A Belgian statesman. He was born at Tournay, and pursued the study of law in his native town, showing remarkable intellectual gifts and a fine power of oratory. Shortly after he had begun the practice of his profession, he was summoned to be professor of law at the University of Brussels, and presently established his reputation by a treatise on the relations of Church and State. He was chosen to the House of Deputies from Tournay in 1862, and affiliated himself with the Liberal party, then under the leadership of Frère-Orban. In the fierce conflicts between Liberals and Catholics, Bara speedily obtained a reputation as one of the most effective debaters in the Chamber, and upon the resignation of Tesch as Minister of Justice in 1865, he was appointed by the King to that position. In line with his extremely Liberal tendencies, he attempted, in 1868, to bring about the abolition of capital punishment, but failed because of a powerful opposition in the Senate; in the following year, however, he succeeded in effecting the abolition of imprisonment for debt. After the fall of the Frère-Orban Cabinet in 1870, Bara reëntered the Chamber of Deputies, and by his great power of invective, caused the resignation of the Clerical Ministry of d'Anethan in 1871, and helped to overthrow the Ministry of Malou in 1878. This was followed by the accession of the Liberals to power, and Bara became once more Minister of Justice under Frère-Orban, resigning in 1884 after the overwhelming defeat of the Liberals at the polls. From 1884 to 1894 he was leader of the opposition in the Lower Chamber, but in the latter year failed of reëlection, entering the Senate soon afterwards. He died at Brussels, June 26, 1900.

BARABA, bä′rȧ-bä′. A steppe in the governments of Tomsk and Tobolsk, West Siberia, between the rivers Irtish and Ob (Map: Asia, G 3). It is a large stretch of low, flat, stoneless land, covered by lakes and marshes, and traversed by a number of rivers. The soil is generally fertile, with extensive forests in the north, but the climate is unhealthful. The first Russian settlements were established about 1730.

BARAB′AS. The principal character in Marlowe's tragedy, *The Jew of Malta*, a monstrous creature who delighted in slaying others. He poisons nunneries, and devises instruments of torture and death. By accident he himself meets the terrible death plotted for a victim. Shakespeare's Shylock is a humanized copy of the character. The rôle was created by Alleyn.

BARAB′BAS. The name of a prisoner whom Pilate released at the Passover when he condemned Jesus to death. It is the Greek form of *Bar abba*, 'son of the father,' or 'son of the master.' The oldest witness as to the text in Matt. xxvii. 16f. read Jesus before Barabbas, and it is therefore probable that his proper name was Jesus, 'son of the rabbi,' being added as a distinction. Mark seems to have derived from an earlier source the information that he had been arrested as participant in an insurrection (xv. 6-15). His release may have been particularly gratifying to the people because he was the son of a rabbi.

BARABOO, bär′ȧ-bo͞o. A city and county-seat of Sauk County, Wis., 37 miles northwest of the State capital, Madison; on the Baraboo River, and on the Chicago and Northwestern Railroad (Map: Wisconsin, D 5). It has a beautiful location, at an elevation of over 1000 feet above sea-level, in a picturesque region, and is but 3 miles north of Devil's Lake. The city is an important fruit market, and has linen and woolen mills, a canning-factory, a foundry, railroad-shops, and a creamery. Manufacturing interests are promoted by good water-power. Baraboo, incorporated in 1882, is governed by a mayor, elected biennially, and a municipal council. Population in 1890, 4605; in 1900, 5751.

BARABRA, bȧ-rä'brȧ, or **BER'BERINE.** (Ar.). A mixed ethnic group, Nubian, Egyptian, and Arab, living on the Middle Nile, between the First and the Fourth Cataract. Cephalic index, 76. The Dongolese belong to this group.

BARACOA, bä'rȧ-kō'ȧ. A seaport town in the Province of Santiago de Cuba, on the northeastern coast of Cuba, about 90 miles east by north of the city of Santiago (Map: Cuba, L 6). It exports tropical fruits. Founded by Diego Velasquez in 1512, the first settlement on the island, Baracoa was the capital of Cuba from 1518 to 1522. Near here Maceo and his handful of followers inaugurated in February, 1895, the revolution which terminated in Cuban independence. Population, in 1899, 4937.

BARADA, bȧ-rä'dȧ. Supposed to be the Abana of the Bible, and called Chrysorrhoas by the Greeks. A river of Syria, which rises in Antilibanus, and flowing southeastward, passes through Damascus, where it is divided into several branches, and empties into the marshy Meadow Lakes, 18 miles east of the city (Map: Palestine, E 1). Its waters are used extensively for the irrigation of the gardens of Damascus.

BARADAS, bȧ'rȧ'dä', COUNT. A character in Bulwer's *Richelieu*, who conspires against the Cardinal. He is a favorite of Louis XIII., whom he also desires to slay. His plot to place the Duke of Orleans on the throne is discovered just as he is raised to the position of prime minister.

BARAGA, bär'ȧ-gȧ, FRIEDRICH (1797-1868). An Austrian Roman Catholic bishop and missionary. He was born in Carniola, Austria; came to this country in 1830, and spent the remainder of his life in the Chippewa and Ottawa missions in Michigan. He prepared a Chippewa grammar (1851) and dictionary (1851-53), which may be considered as taking high rank among contributions to Indian philology. He also wrote in German a work on the *History, Character, Manners, and Habits of the North American Indians* (1837).

BARAGUAY D'HILLIERS, bȧ'rȧ'gȧ'dē'yȧ', ACHILLE (1795-1878). A French general, the son of Louis Baraguay d'Hilliers (q.v.). He was born in Paris, entered the army, and was wounded at the battle of Leipzig, 1813. He served in Spain in 1823, obtained in 1832 the appointment of lieutenant-governor in the military school of St. Cyr, where he suppressed a republican conspiracy, and made a number of campaigns in Algeria. After the Revolution of February, 1848, he was chosen a member of the National Assembly, in which he joined the party of reaction. In the beginning of November, 1849, he went to Rome as commander-in-chief of the French army sent to sustain the authority of the Pope. He returned in 1850, and in January, 1851, obtained the command of the Army of Paris, in the place of Changarnier. Baraguay d'Hilliers concurred in the policy of the coup d'état of December, 1851, and was made a member of the Consultative Commission. During the Crimean War he received the command of the French Expeditionary Corps of the Baltic, and coöperated with the British fleet in the capture of Bomarsund. He was afterwards made a marshal of France, and took part in the Italian War of 1859, distinguishing himself at Solferino. In 1871 he was made president of the court appointed to investigate the conduct of the generals who had surrendered fortresses during the war with Prussia.

BARAGUAY D'HILLIERS, LOUIS (1764-1813). A distinguished general of the French Empire. He was born in Paris, and after serving under Custine and Menou, received an appointment in the Army of Italy from Napoleon, serving in the campaigns of 1796-97. He was made a general of division, and after the preliminaries of Leoben, April 18, 1797, became commandant of Venice. He accompanied the expedition to Egypt, and afterwards successively held appointments in the armies of the Rhine and the Tyrol, and in Catalonia. He headed a division in the Russian campaign of 1812, but on the retreat he incurred the displeasure of Napoleon. He was sent as governor to Berlin, where he died soon afterwards.

BARANOFF, bȧ-rä'nôf, ALEXANDER ANDREYEVITCH (1746-1819). The first Governor of Russian America. In 1796 he established a colony on Bering Strait; in 1799 took possession of the largest of the Sitka Islands (now Baranov Island), began trade with the natives, and subsequently extended his operations to Canton, the Hawaiian Islands, Boston, New York, and other distant places. He founded a small colony in California, near the present San Francisco, but this was soon abandoned. He died at sea near Java, while on his return to Russia.

BARANOV (bȧ-rä'nôf) **IS'LAND.** The most important island of the Alexander Archipelago, off the southwest coast of Alaska (Map: Alaska, H 4). It is about 100 miles long and 25 miles broad in its widest part. Sitka (population, in 1900, 1396), the capital of the Territory, is on the northwest coast of the island.

BARANTE, bȧ'räNt', AIMABLE GUILLAUME PROSPER BRUGIÈRE, Baron de (1782-1866). A French statesman and historian. While yet young he was employed in political missions in Germany, Poland, and Spain, and was prefect at Nantes at the time of Napoleon's return from Elba, when he at once resigned. On the Second Restoration he was made Councilor of State and Secretary-General to the Minister of the Interior, and was elected to the Chamber of Deputies. In 1819 he was made a peer of France, and took an active part in the debates of the Chamber. After the Revolution of 1830, he was sent as Ambassador to Turin, and five years later filled the same position at Saint Petersburg. He supported Louis Philippe, and retired from public life on the fall of the monarchy in 1848. His great work is the *Histoire des ducs de Bourgogne* (1824, 8th ed. 1858), which procured for him membership in the Academy. Among his other works are *Histoire de la Convention nationale* (1851-53); *Histoire du Directoire* (1855); *Etudes historiques et biographiques* (1857); and *Etudes littéraires et historiques* (1858). Consult *Souvenirs du baron de Barante*, edited by his grandson (Paris, 1890-99).

BARASINGHA, bär'ȧ-siŋ'gȧ. A swamp-deer (*Cervus Duvaucelli*) of Northern India—a native name adopted by sportsmen. See SWAMP-DEER.

BARATARIA, bä'rȧ-tȧ-rē'ȧ. A name, signifying 'deception,' given to an island which appears in fairy tales. In Cervantes's *Don Quixote*, Sancho Panza is made Governor of Barataria, but resigns his honors in disgust over his experiences at the inaugural feast, when appetizing dishes are placed before him, but removed before he has a chance to eat.

BAR'ATA'RIA, Pirates of. In American history, a company of outlaws who established themselves in and near the Bay of Barataria, La., on the west side of the Mississippi Delta, about 40 miles south of New Orleans, whence they emerged to commit depredations on the shipping of England and Spain. Under the leadership of the notorious Jean Lafitte (q.v.), they rapidly increased in numbers and audacity, and succeeded in capturing large quantities of booty, which they disposed of through their agents at New Orleans. Their colony was broken up in September, 1814, by Commander Daniel T. Patterson, of the United States Navy. Subsequently Lafitte and a number of his men volunteered for the defense of New Orleans against the British, and served with gallantry under Jackson in the battle of January 8, 1815. Consult two articles on "Jean and Pierre Lafitte," by Charles Gayarre, in Vol. X. of *The Magazine of American History* (New York, 1885).

BAR'ATHRON. A deep gorge outside of Athens, originally a quarry, and artificially enlarged, into which criminals condemned to death were hurled. Here the messengers sent by Darius to demand symbols of submission from the Athenians were put to death.

BARATIERI, bä'rȧ-tyā'rē, Oreste (1841-1904). An Italian general, born at Condino, in the Tyrol. He fought under Garibaldi in Sicily in 1860, and after the war against Austria in 1866 joined the regular army. In 1891 he was made Governor of Eritrea, the new possession of Italy on the Abyssinian coastland, in Africa. In pursuance of the ambitious schemes of conquest entertained by the Italians, and in violation of a treaty concluded with the Negus Menelek in 1889, General Baratieri advanced into the highlands of the interior to the west and southwest of Massowah, and after a long campaign captured Kassala, in July, 1894. Advancing thence into Tigré (q.v.), he twice defeated the *ras*, or prince, of that country in January, 1895. The conquests of the Italians finally drove Menelek to resistance; the latter's generals took the field with 100,000 men, and Baratieri was forced to retreat from Adowa, the capital of Tigré, toward Adigrat. Fearing, however, to continue his retreat lest his forces should be thoroughly demoralized, he resolved to attack the Abyssinians, advanced once more on Adowa, and on the morning of March 1 joined battle on the heights near that place. So fierce was the onslaught of the Shouan forces of Menelek that the Italians were routed, with the loss of 250 officers, 7000 men, and all their artillery. General Baratieri was brought before a court-martial, which absolved him of criminal responsibility, but censured at the same time his conduct of the campaign. Baratieri left the army in the same year. In 1897 he published *Memorie d'Africa*, in the nature of a defense.

BARATYNSKI, bä'rȧ-tĭn'skē, Yevgeni Abramovich (1800-44). A Russian poet and friend of Pushkin. While serving as a soldier in Finland, he was so impressed by the stern grandeur and picturesqueness of nature that he embodied these aspects in his poem *Eda* (1826). His best work is *The Gypsy*, a popular poem picturing Russian high life. His complete works were published at Moscow (1869; ed. 4, Kazan, 1884); Fiedler's *Russischer Parnass* (Dresden, 1889) contains several of his poems in German translation.

BARB (Fr. *barbe*, from *Barbarie*, Barbary). A distinct variety of the Arabian horse cultivated by the Moors of Barbary, and introduced by them into Spain. Barbs are less remarkable for their beauty and symmetry than for their speed and endurance when stimulated by the excitement of a contest. The most celebrated barb to leave his mark upon the thoroughbreds of the world was the horse commonly known as the "Godolphin Barb," from the family name of his English owner, the Duke of Leeds (of the Godolphin family). Nearly every race-horse of note on the English turf has a strain of the blood of this famous animal, who died in December, 1753, aged 29 years.

BARB (i.e. Barbary) **APE, HORSE, PIGEON,** etc. See the substantives.

BAR'BACAN. See Barbican.

BARBACENA, bär'bȧ-sā'nȧ, Caldeira Brant Pontes Felisberto, Marquis of (1772-1841). A Brazilian soldier and statesman, born near Marianna, State of Minas Geraes. He became a member of the Constitutional Assembly in 1823, and was elected senator in 1826. When in command in 1827 of the Brazilian forces in Uruguay, he was defeated at Ituzaingó. In 1828 he accompanied to Lisbon Maria II., the young Queen of Portugal, whose rights he very skillfully maintained. He was Brazilian Prime Minister in 1829-30.

BARBA'DOS (Portug., the bearded, from the bearded fig tree, *Ficus barbata*, found there in abundance). The most easterly of the West Indian islands, a possession of Great Britain, situated 78 miles east of St. Vincent, in latitude 13° 4' N., and longitude 59° 37' W. (Map: West Indies, R 8.) It has an area of 166 square miles. The surface, generally flat along the coast, which is surrounded by coral reefs, is elevated in the interior, where Mount Hillaby, the highest point, rises to about 1100 feet. Barbados has a healthful, and, for a tropical island, a moderate climate, the mean temperature being about 80°. Earthquakes occur infrequently, but occasional hurricanes have caused great distress.

The soil is especially adapted to the cultivation of sugar-cane, which forms the staple of the island. Of the 106,240 acres occupied by Barbados, about 100,000 acres are under cultivation, nearly one-third of which is devoted to sugar culture. Next in the rank of production come cotton, tobacco, coffee, indigo, and arrowroot. There are numerous sugar-works and several rum distilleries, and the fishing interests are of importance. The commerce of Barbados in 1900 comprised imports valued at £1,045,252 ($5,226,260), and exports, £909,011 ($4,545,055); the principal articles exported being sugar, molasses, and rum; while the imports consisted largely of textiles, flour, rice, and fish. Manjak, a variety of bitumen, is exported to some extent.

The administration of the island is vested in a governor who is assisted by an executive committee, a legislative council of 9 appointed members, and the House of Assembly, which consists of 24 members, elected annually by popular vote. Education is under the direction of the Government, which also subsidizes the various religious denominations represented on the island. Besides primary and secondary educational institutions, Barbados has Codrington College, which is in affiliation with Durham University, England. The revenue and expenditure of the colony for 1900, respectively, were: £185,475 ($927,375) and £182,866 ($914,330). Barbados is the headquarters of the British troops in the West Indies. The island has 24 miles of railroad, 470 miles of roads, and 635 miles of telephone lines. The United States is represented by a consulate. The capital and principal port (the only harbor on the island) is Bridgetown (q.v.), which is also the see of a bishop of the Anglican Church. The population of Barbados in 1891 was 182,306, and in 1900 it was estimated at about 195,000.

Barbados was first mentioned in the beginning of the Sixteenth Century, and is supposed to have been visited by English seamen in 1605, but it was not colonized until 1625. After being granted several times to different English noblemen, it was finally, in 1663, assumed by the Crown. The Continental wars of the Eighteenth Century were felt severely by Barbados, as the West Indies were the scene of important conflicts in the struggle between France and England. A period of prosperity succeeded the abolition of slavery in 1834. The riots of 1876, resulting from the proposed confederation of the Windward Islands, caused a considerable loss of life and property. Barbados has experienced several disastrous hurricanes, notably those of 1780 and of 1831, and, in more recent times, of 1898, all of which necessitated relief measures on the part of the Imperial Government. (See BRITISH WEST INDIES.) Consult Stark, *History and Guide to Barbados* (Boston, 1893).

BARBADOS CHER′RY. The name given in the West Indies to the fruit of two small trees or shrubs, *Malpighia urens* and *Malpighia glabra*, which are cultivated for its sake. Clusters of fruit are produced from the axils of the leaves. The fruit of Malpighia urens is small; that of Malpighia glabra is like a mayduke cherry in size and appearance, but inferior in flavor. Each fruit contains a three or four angled stone. The leaves of Malpighia urens have stinging hairs on the under side.

BARBADOS GOOSE′BERRY (*Pereskia aculeata*). A plant not belonging to the gooseberry tribe, but to the cactus family. It is a native of the West Indies and tropical America. The fruit is pear or egg shaped, edible, but possesses expectorant properties. Pereskia plants are of value in that they furnish stocks upon which are grafted other kinds of cacti. Pereskia aculeata is chiefly used for this purpose, although Pereskia bleo is more vigorous, and therefore better suited for use with tall stocks.

BARBADOS LEG, COCHIN-CHINA LEG, or TROPICAL BIG LEG. The common names of elephantiasis (q.v.), derived from the fact that in that disease the lower extremities are most commonly affected, increasing to an enormous size. This increase is due to hypertrophy of the skin and subcutaneous tissues, the exudates accompanying inflammation and the obstruction of the lymph channels. The leg and foot become a distorted mass, the calf commonly measuring 30 inches in circumference. The disease prevails as an endemic in tropical and semi-tropical countries.

BAR′BARA, SAINT. A saint of the Roman Catholic Church, who, according to legends, suffered martyrdom at Nicomedia, in Bithynia, about 236, or, according to other accounts, at Heliopolis, in Egypt, about 306. She was of good birth, and well educated by her father, Dioscorus. To avoid disturbance in her studies he had a tower built for her, where she spent her youth in the deepest solitude. While in this retirement she was induced by Origen, as is said, to embrace Christianity. Her father, a fanatic heathen, learning his daughter's conversion, and failing to induce her to renounce Christ, delivered her up to the governor, Martianus, to be dealt with by the law. Martianus, struck with the intelligence and beauty of the maiden, attempted first by arguments to make her relinquish Christianity, and when that failed, had recourse to the most exquisite tortures. At last, the blinded father offered himself to strike off his daughter's head. Scarcely was the deed done, when he was struck with lightning. Hence Saint Barbara is to this day prayed to in storms. For the same reason she is the patron saint of artillery, and her image was at one time frequently placed on arsenals, powder magazines, etc. The powder-room in a French ship-of-war is to this day called *Sainte-Barbe*. Saint Barbara's day is December 4th.

BARBARA AL′LEN'S CRU′ELTY. One of the old ballads in Percy's *Reliques*. When her lover, Jemmy Groves, lay on his death-bed, all Barbara Allen said to him was: "Young man, I think you're dying!" For this heartless composure she suffered great remorse.

BARBARA FRIETCH′IE. A famous poem by John Greenleaf Whittier (1863), first published in the *Atlantic Monthly*. The poem is based on the report of a patriotic act of an aged woman in Frederick, Md., in the Civil War.

BARBA′REA. See CRESS.

BARBARELLI, bär′bȧ-rĕl′lē, GIORGIO. See GIORGIONE.

BARBARI, bär′bȧ-rē, JACOPO DE'. See JACOPO DE' BARBARI.

BARBA′RIAN (Gk. βάρβαρος, *barbaros*, non-Greek, barbarian). Among the Greeks, from the time of Homer, a designation for one who spoke a language other than Greek. This restricted signification prevailed until the Roman period. Plato, for example, divides the entire human race into Hellenes and Barbarians. The word is probably onomatopoetic in its origin, intended to represent a meaningless babble of sound, such as the Greeks conceived all foreign languages to be. It first began to acquire its secondary and invidious signification at the period of the Persian wars, when the Greeks, who always exhibited a proud consciousness of their superior intellect and privileges, employed the term to designate the character of their enemies. It then meant whatever was opposed to Greek civilization, freedom, or intelligence; the Romans were naturally included by the Greeks under the general term, and Plautus, in his adaptations of the *New Comedy*, uses *barbarus* in the sense of 'Roman.' The adjective was not so used, however, by the Romans of themselves; but was adopted by them in its original sense to designate all peoples who differed from the Græco-Roman world in culture and language.

BAR'BAROS'SA. See Frederick I.

BARBAROSSA, Horuk and Khair-ed-Din. Two pirate chiefs, brothers. They were renegade Greeks, natives of Mitylene, and as Turkish corsairs were the terror of the Mediterranean during the first part of the Sixteenth Century. They made themselves masters of Algeria (q.v.) and Tunis, and brought these countries under the sovereignty of the Turkish Sultan. Horuk, the elder of the two, fell in battle against an army of the Emperor Charles V. (1518). The younger was more successful. He captured Tunis and fought under Sultan Solyman II. against Charles, defeating the Imperial Admiral Doria, and ravaged the Ionian Islands. He died in 1546. Consult: Lane-Poole and Kelley, *The Story of the Barbary Corsairs* (London, 1891); Rang and Denis, *Histoire de Barberousse* (Paris, 1837).

BARBAROUX, bär'bȧ'rōō', Charles Jean Marie (1767-94). A French revolutionist. He was born in Marseilles, and as a youth eagerly embraced the doctrines of the Revolution. He was elected a special delegate from Marseilles to the Legislative Assembly in Paris. There he opposed the Court, and took sides with the minister, Roland. Upon his invitation, the famous battalion which brought the 'Marseillaise' to Paris and led in the storming of the Tuileries on August 10, 1792, set out from Marseilles. After the events of the 10th of August he returned to his native town, where he was received with enthusiasm, and was soon after chosen delegate to the Convention. In the Convention he adhered to the Girondists, and was among those who, at the trial of the King, voted for the death sentence with an appeal to the people. As Barbaroux boldly opposed the party of Marat and Robespierre, and even directly accused the latter of aiming at the dictatorship, he was proscribed as a royalist and an enemy of the Republic, in May, 1793. He wandered about the country, hiding himself as he best could, for thirteen months, but was taken and guillotined at Bordeaux, June 25, 1794. Barbaroux was a man of striking beauty and of great force of intellect, understanding the Revolutionary crisis much better than most of his party. He was a sound economist and financier; and had the Girondists generally possessed anything like his energy and sagacity their fall might have been averted. His *Mémoires* were published in Paris in 1822 and 1866.

BAR'BARY POW'ERS, Wars with the. From the time of the Middle Ages, the Mohammedan powers on the north coast of Africa lived largely by piracy and blackmail, capturing and confiscating (or holding for ransom) the shipping of such nations as did not pay a liberal tribute. In 1785 they began to molest the American shipping, which before the Revolution had been protected by British passes, and the United States Government, following the example of European powers, concluded treaties with Morocco (1786-87), Algeria (1795), Tripoli (1796), and Tunis (1799), securing immunity from attack by money payments. The corsairs continued arrogant, however; and in 1801 Tripoli, after having been denied a larger tribute, declared war. American squadrons were sent to the Mediterranean under Commodores Dale (1801), Morris (1802), and Preble (1804); the Tripolitan ports were blockaded and bombarded; a number of the piratical cruisers were captured; and in June, 1805, Tripoli was forced to make peace. The chief events of the war were the grounding and capture of the *Philadelphia*, in the harbor of Tripoli (October 31, 1803), and her destruction by Decatur (February 16, 1804), the bombardment of Tripoli, and the celebrated land expedition under William Eaton in 1805. (See Bainbridge, William; Decatur, Stephen; and Eaton, William.) Renewed attacks by the Barbary vessels began with the abandonment (in 1810) of the restrictive policy exemplified in the embargo of 1807. (See Embargo.) Algeria formally declared war in 1812, and gave considerable assistance to the British in the years 1812-15. In 1815 Decatur, proceeding with ten vessels to the Mediterranean, speedily brought Algeria to terms, and in addition forced Tunis and Tripoli to sign treaties formally renouncing future exactions of tribute. The United States was the first power thus to check the aggressions of the pirates, and her example was soon followed by the various maritime countries of Europe. The earlier wars gave an efficient training to the American sailors, and demonstrated the futility of Jefferson's famous 'gunboat system.' Consult: Stanley Lane-Poole, *The Story of the Barbary Corsairs* (New York, 1891), and E. S. Maclay, *History of the Navy* (3 vols., New York, 1894-1901). An excellent account is also given in Henry Adams's *History of the United States from 1801 to 1817* (9 vols., New York, 1889-91).

BARBARY STATES (derived from *Berbers*; see below). The countries of Morocco, Algeria, Tunis, Tripoli, and Barca, known in Roman times as Mauretania, Numidia, Africa Propria, and Cyrenaica. They lie between longitudes 10° W. and 25° E., and latitudes 25° to 37° N. The western half of this region is traversed by the Atlas Mountains, south of which lies the desert tract of the Sahara. Most of the region, while pertaining geographically to Africa, is not specially African in its characteristics; but in geological configuration, climate, flora, and fauna, belongs to the basin of the Mediterranean. It is watered by many small streams, which either flow into the Mediterranean or into a series of salt lakes that lie on the plateaus between the mountain elevations. A large portion of the country is capable of cultivation, and many of the products of the north, fruits and vegetables, are brought to great perfection, the Algerian grape being of particularly fine quality. Millet and other grains are largely grown. Sheep-raising is an extensive industry with the Arabs. During the times of the Carthaginians, Greeks, and Romans, the region was exceedingly productive, owing to the elaborate systems of irrigation which were constructed. Most of the natural conditions of its ancient productiveness still remain. Among the people, besides the French and other Europeans, several distinct races may be enumerated: Berbers—the ancient autochthonous race from whom comes the name—Moors and settled Arabs, Bedouins or wandering Arabs, Jews, Turks, Kuluglis, and Negroes. The Berbers inhabit the open country, while the Moors reside in the towns. Jews settled here in ancient times, but the greater number of that race immigrated at the time of their expulsion from Spain. The Turks entered the Barbary States in the Sixteenth Century, and soon extended their sway westward as far as the borders of Morocco. They still retain their hold on Tripoli and Barca. The Kuluglis (the children of Turks by native mothers) are excluded from the possession of all the paternal rights and privileges. The Negroes are not natives, but are brought thither principally from Sudan and Guinea. The great majority of the population is Mohammedan. Arabic is the language of commerce and intercourse, and in Morocco the language of Government, and the mother-tongue of Bedouins, Moors, and even Jews; but in Tripoli the language of Government is Turkish. The Berbers proper, in the highlands, to which they have been driven by foreign conquerors, use a peculiar speech.

In the oldest historical times the Mauri (the ancestors of the modern Moors) dwelt in the northwest; the Numidians occupied the interior and eastern parts; and Phœnician colonies were situated on the coasts. The Phœnicians founded cities—among them Utica, Hippo, Hadrumetum, Leptis, and afterwards Carthage—from about B.C. 1050 to 850. Confining themselves to the coast between the Great Syrtis and the Straits of Gibraltar, they maintained commerce with the people of the interior and the seaports of the Mediterranean. In the Seventh Century B.C. the Greeks founded Cyrene, and colonized the plateau of Barca. While the Phœnician colonies held sway on the coast, the Mauri and the Numidians were divided into several independent tribes, and, like their neighbors, the Gætuli, were wholly uncivilized. After the Second Punic War, the Romans extended their sway over Carthaginian Africa, which became a Roman province at the close of the Third Punic War, when the city of Carthage was sacked and destroyed (B.C. 146). Numidia was annexed after the victory over Jugurtha, and Mauretania after the defeat of Juba and the Pompeians by Cæsar. The son of Juba, bearing the same name, was allowed to reign as a nominal sovereign by Augustus, but Mauretania was in fact a Roman province. The territory thus acquired by the Romans formed some of the largest and most flourishing provinces of their vast empire. They built large towns, whose extensive ruins are still to be seen scattered over the land, even to the verge of the Desert. Everywhere they executed important works, such as the cisterns and aqueducts at Rusicada, Hippo, and Cirta, and the temples and amphitheatres of Calama and Anuna, which clearly show that the inhabitants enjoyed the benefits of a secure civilization. Under Constantine North Africa was divided into nine provinces. At the division of the Empire, all of these, except one, the Regio Syrtica, fell to the share of the Western Empire. Christianity took a strong hold in Roman Africa, and in the three Mauretanias there were more than 160 dioceses. The decline of Roman power produced a state of anarchy in the African provinces, and they easily fell a prey to the Vandals under Genseric in A.D. 429. The Vandal kingdom continued until 533, when it was overthrown by Justinian's great general, Belisarius. The Numidians and the Mauri made themselves masters of the interior and of the coast of Mauretania Tingitana, and the Byzantine territories were restricted to the neighborhood of Carthage and some points on the coast. North Africa was swept in 647 by an Arabic invasion, impelled by the first Mohammedan impulse of conquest. The first invader, Abdallah-ben-Said, carried the banner of the Crescent through Tripoli. He was followed by Akbar (665-670), who completed the conquest of Tripoli to the edge of the Desert. Hassan, the general of the Caliph Abd-el-Malek, in 692 destroyed the new Carthage. In the course of less than a century the greater part of the native tribes were converted forcibly to the faith of Islam. In 711 the Saracens crossed over from Africa into Spain, which they conquered within three years. In 789 the western provinces of Mohammedan Africa separated themselves from the others, and Edris-ben-Abdallah founded there the dynasty of the Edrisites. In 800 the governor of the eastern provinces, Ibrahim-ben-Aglab, declared himself independent, and founded the dynasty of the Aglabites. From this time down to 1269 the changes of dynasty in Barbary were frequent. Numerous independent States arose. At the close of the Eleventh Century the Almoravides, who had established their sway in Morocco, made themselves masters of Mohammedan Spain. In the middle of the Twelfth Century they succumbed to the Almohades. The conquest of the Moors in Spain by the Christians was followed by their settlement on the coast of Northern Africa, where they began their career of piracy, at first as a retaliation against their Christian foes, but ultimately as a barbarous profession. As early as the time of Ferdinand the Catholic, the Spaniards sought to check their ravages, and invaded Africa on several occasions, capturing the ports of Ceuta, Melilla, Oran, Bugia (Bougie), the island before Algiers, and Tripoli. The Portuguese landed on the coast of Morocco, where at first they had great success; but they were ultimately compelled to leave the country. In the course of the Sixteenth Century Algiers, Tripoli, and Tunis were brought under the government of the Turkish Sultan. The Dey of Algiers shook off the authority of Turkey about the beginning of the Eighteenth Century. The French established their sway in Algeria after a bloody war, which lasted from 1830 to 1847. In 1881 Tunis was placed under French protection. For an account of the modern States comprised within this region, see the articles Morocco; Tunis; Algeria; Tripoli; Fezzan; and Barca.

BARBASTELLE, bär'bȧ-stĕl (Fr., from Lat. *barba*, beard). A European long-eared bat. See Bat.

BARBASTRO, bär-bä'strȯ. A town in the Province of Huesca, Aragon, Spain, on the Vero, 30 miles southeast of Huesca (Map: Spain, F 2). It is the terminus of a branch railway line with a junction at Selgua, 12½ miles distant. The town is an episcopal see, is surrounded by walls, and has a Sixteenth-Century cathedral, containing paintings by Antonio Galaran. Population, in 1897, 7194.

BARBATELLI, bär′bȧ-tĕl′lē. See Poccetti, Bernardino.

BAR′BAULD, Anna Letitia (1743-1825). An English author. She was born June 20, 1743, at Kibworth, Leicestershire, where her father, the Rev. John Aikin, a Dissenting clergyman, kept an academy. Her private education, the religious influence of her home, and secluded life in the country, were well fitted to develop early her natural taste for poetry. In 1773 she published her first volume of poems, of which four editions were called for during the year. The same year appeared *Miscellaneous Pieces in Prose,* written conjointly with her brother, John Aikin. This volume was also several times reprinted. The next year she married the Rev. Rochement Barbauld, a Dissenting minister at Palgrave, in Suffolk, where they soon opened a boarding-school for boys. The literary fame and exertions of Mrs. Barbauld soon made it known. During the ten years in which Mrs. Barbauld was engaged in giving instruction here, she published *Early Lessons for Children,* and the charming *Hymns in Prose,* works which have been often reprinted in England, and translated into several languages. Her *Devotional Pieces* was also published during this period. In 1792 she commenced with her brother the well-known series, *Evenings at Home,* which was completed in three years. In 1804 she edited the letters of Samuel Richardson, prefixing to them the best memoir of the novelist that has yet been written; and in 1810 she published a collection of the British novelists in 50 volumes, the task of editing which she had undertaken to divert her mind from the loss she had sustained two years before in the death of her husband. In 1811 she prepared, under the title, *The Female Speaker,* a selection from the best English poets and prose-writers. Her last published work was an ode, entitled *Eighteen Hundred and Eleven.* All her compositions are characterized by simplicity of feeling, an easy, flowing style, and pure and elevated sentiment. Her *Ode to Life* is an admirable lyric. She lived in quiet retirement till her death, March 9, 1825. Consult: Aikin, *Works of A. L. Barbauld,* with memoir (London, 1825); Ellis, *Life* (Boston, 1874); Mrs. Thackeray-Ritchie, *Book of Sibyls* (London and New York, 1883).

BARBE-BLEU, bärb′blẽ′ (Fr., Bluebeard). (1) A light opera presented in 1866, libretto by Meilhac and Halévy, score by Offenbach. (2) Comic opera by Sedaine, with score by Grétry, performed in Paris, 1789. See Bluebeard.

BAR′BECUE. A term originally applied, in the Southern States especially, to the practice of roasting a hog, ox, or other large animal entire, by splitting it to the backbone, and placing it on a rude gridiron of stakes. The use of the word is now extended to mean a large public entertainment, held in the open air, where animals are roasted whole, and food and drink of all kinds are provided in liberal quantities. The word was in use in Virginia before 1700. The origin of the name 'barbecue' is disputed. Some think it comes from the Indians of Guiana, who used the word *berbekot* to denote the wooden grills on which they smoked or dried their meats and fish. Others would derive it from the Haitian *barbacóa,* identical in meaning with *berbekot,* while still others have traced the term to the French *barbe-à-queue,* i.e. 'from snout to tail.' The barbecue is a frequent accompaniment of open-air political meetings in the West and South.

BARBED AND CREST′ED. Heraldic terms indicating that the gills and combs of a cock are of a different tincture from the body. The common English designation is 'wattled and combed,' with the name of the tincture.

BARBED WIRE. See Wire.

BAR′BEL (L.Lat. *barbellus,* dimin. of *barbus,* same meaning, from Lat. *barba,* beard). An Old World carp-like fresh-water fish of the cyprinoid genus *Barbus,* with four fleshy appendages (barbules) hanging from the snout and upper jaw, which project beyond the inferior mouth and are of use in plowing through the mud in search of food. The common one (*Barbus vulgaris*) is abundant in the streams both of England and Continental Europe, and may reach a weight of 15 to 18 pounds. It affords some sport to the angler, but its coarse flesh is seldom eaten. The genus is very numerous in edible species in the waters of Asia, the East Indian Archipelago, and tropical Africa, and some reach a length of 6 feet. See Plate of Carps and Allies.

BARBÉ-MARBOIS, bär′bȧ′ mär′bwä′, François, Marquis de (1745-1837). A French statesman. From 1779 to 1785 he was connected with the French Embassy in the United States. He married (1783) a daughter of William Moore, of Pennsylvania. In 1785 he was Governor of Haiti, where he introduced many reforms. In 1797 he was exiled to Guiana for political reasons, but was recalled in 1799 and made Minister of Finance in 1801. He negotiated the sale of Louisiana to the United States, and obtained 30,000,000 francs more than Napoleon really asked, for which he was liberally rewarded. He was a member of the Senate in 1813, and favored the restoration of the Bourbons, for which Louis XVIII. made him a peer of France and Minister of Justice. After the Revolution of July, he swore fealty to Louis Philippe. Among his works are writings on Santo Domingo and Guiana; a history of the treason of Arnold; and one on the cession of Louisiana.

BAR′BER (ME. *barbour,* OF. *barbeor,* from Lat. *barba,* beard). One who shaves the beard, and ordinarily includes hair-cutting in his profession. The office is of great antiquity, and is referred to by the Prophet Ezekiel: "And thou, son of man, take thee a barber's razor, and cause it to pass upon thine head and upon thy beard." From ancient monuments and papyri we know that the Egyptians shaved both the beard and the head. In all Eastern countries, including China, the shaving of the whole or part of the head continues to be performed by barbers. The barber-shops of Athens and Rome were great meeting-places for idlers and gossips.

The most important and dignified portion of the history of barbers relates to the period when in all European countries they had the right to practice elementary medicine and surgery, and were known as *barber-surgeons.* Relics of this combination of functions are the brass basin still hung out as a sign at the door of European barber-shops, and the red band about the pole, which represents the bandage with which they stopped the bleeding incident to their operations. The existence of barbers as professors of the healing art can be traced in England as far back as 1461, when they were first incorporated. In 1546 they were united with the surgeons. The connection was dissolved by an act of 1745, whose preamble asserts that the business or trade of a barber is "foreign to, and independent of, the practice of surgery"; at the same time the privileges of the barbers as a company or corporation were expressly preserved to them. The statutes of Heriot's Hospital, compiled in 1627, include among the officers "one chirurgeon barber, who shall cut and pole the hair of all the scholars of the hospital, and also look to the cure of all those within the hospital who shall anyway stand in need of his art." In Markwell Street, Cripplegate, London, the ancient hall formerly used by the barber-surgeons is still standing.

In France, barber-surgeons were organized in 1371 into a corporation which was under the jurisdiction of the King's barber, and existed until the Revolution. In the Seventeenth Century wigs (q.v.) became so elaborate that a distinct corporation was formed of *barbiers perruquiers,* who also shaved and cut the hair. In Germany, though the trade of the barbers was long connected with the art of surgery, they were not formed into a corporation until 1773 (in Prussia, 1779). This was dissolved in 1809, and new unions formed in the middle of the century, with strict regulations. Consult: *Annals of the Barber-Surgeons of London* (London, 1890); L'Espinasse, *Les métiers et corporations de la ville de Paris* (Paris, 1886-97). See also Beard; Hair-Dressing.

BARBER. A widespread South African catfish (*Clarias Capensis*). It reaches 50 to 60 pounds in weight, and young ones are esteemed as food; it is also one of the main resources of crocodiles. It takes the hook readily, and gives some sport in overcoming its pluck and strength.

BARBER, Francis (1751-83). An American soldier, born at Princeton, N. J. He graduated at the College of New Jersey in 1767, and in January, 1776, entered the American Army as major of a New Jersey regiment. He became a lieutenant-colonel in November of the same year, was adjutant-general successively under Lord Stirling and General Sullivan, and was seriously wounded at the battles of Monmouth and Newtown and the siege of Yorktown. In 1781 he was selected by Washington to break up a mutiny of the New Jersey and Pennsylvania troops—a duty he performed with singular tact and discretion. He was accidentally killed by a falling tree at Newburgh, N. Y., on February 11, 1783. His order-book during Sullivan's expedition against the Indians in 1779 is in the possession of the New Jersey Historical Society.

BARBER, John Warner (1798-1885). An American historian, born at Windsor, Conn. He published *Historical Scenes in the United States* (1827); *Religious Events* (1832); the *Historical Collections of Connecticut* (1836) and of *Massachusetts* (1839); *Elements of General History* (1844); and *Our Whole Country, Historical and Descriptive* (1861). He also assisted Henry Howe in compiling the historical collections of New York, New Jersey, Virginia, and Ohio.

BARBERINI, bär′bȧ-rē′nė. The name of a celebrated Italian family, prominent in connection with the history of the Papacy in the Seventeenth Century. The Barberini settled in Florence in the Eleventh Century, and became prominent in various ways. Francesco Barberini, a contemporary of Dante, was a jurist and poet. Raffaelle Barberini was an engineer, and was employed by the Duke of Alva in a diplomatic capacity. The family became powerful through Maffeo Barberini, who was elected Pope in 1623 as Urban VIII. He appointed his brother Carlo commander of the Papal forces; another brother, Antonio, was cardinal and Papal Librarian. Francesco, a son of Carlo, was also cardinal, and is known as the founder of the Barberini Library and the builder of the Barberini Palace at Rome. He was a man of learning, and translated Marcus Aurelius. Taddeo, a brother of Francesco, became commander of the Papal forces, was appointed prefect of Rome, and received the principality of Palestrina. He attempted to wrest Castro from the Farnese family of Parma. Antonio, a brother of the two preceding, likewise a cardinal, was invested with the Duchy of Urbino. The wealth and power of the Barberini excited the jealousy of other Italian nobles, and when Urban's successor, Innocent X., ascended the Papal throne, he called the nephews of Urban to account for the mismanagement of their various offices. They were forced to flee, and took refuge in France. Later the family regained their influence in Rome. The principality of Palestrina remained in possession of the Colonna branch of the Barberini family until 1889, when the male line became extinct. Consult: Reumont, *Beiträge zur italienischen Geschichte*, vol. v. (Berlin, 1867); Thomus, *Francesco da Barberini* (Paris, 1883).

BARBERINI FAUN. An example of Greek sculpture, so called because once the property of the Barberini at Rome. It is now in the Glyptothek at Munich. Consult Heinrich Bulle, "Der Barberini Faun," in *Jahrbuch des Kaiserlich Deutschen Archäologischen Instituts* (Berlin, 1901).

BARBERINI PAL′ACE. The home of the Barberini in Rome, the erection of which was undertaken by Urban VIII., the most celebrated of the family. It was not completed, however, till 1640. Its picture gallery contains Guido Reni's "Beatrice Cenci" (q.v.); Domenichino's "Adam and Eve Being Driven out of Paradise," and Albert Dürer's "Christ Disputing with the Doctors." Its library contains upward of 70,000 volumes and 10,000 manuscripts.

BARBER OF SEVILLE. See Barbier de Séville.

BAR′BER POET, The. See Jasmin, Jacques.

BAR′BER′RY (of uncertain origin). *Berberis.* A genus of plants of the natural order Berberidaceæ (q.v.), consisting of two sub-genera that are sometimes ranked as genera. Those with simple leaves form the sub-genus Berberis, and those with pinnate leaves, the sub-genus Mahonia or ash-leaved barberry. The species are low, ornamental shrubs, and native to the temperate regions of both hemispheres. The flowers are yellow and have sensitive stamens. The leaves are various shades of green, and are sometimes variegated. A yellow fungus, Æcidium berberidis, is very general upon the under side of the leaves. This is the 'æcidium state' of the common grain-rust (*Puccinia graminis,* q.v.), and hence in wheat-growing districts the planting of barberry is not advised. The fruit is a red, dark blue, or black berry with two or three seeds. It is generally too acid to be eaten, but is sometimes used to make jelly and preserves. Free malic acid is extensively prepared from the fruit in France. The fruit of the sweet barberry (*Berberis dulcis*), a native of Chile, resembles in size and color that of the black currant. Berberis aristata and Berberis asiatica also produce wholesome and pleasant fruits, which are dried like raisins. The yellow root of the barberry, especially the inner bark, is used for dyeing, as is also that of the stem and branches. Berberis glauca, Berberis ilicipolia, Berberis tomentosa, and Berberis lutea are made use of in this way in Chile and Peru; Berberis tinctoria and Berberis aristata in India. The bark has also been used for tanning. Berberis lycium, a native of Northern India, is particularly astringent, and an extract prepared from it is used in ophthalmia. Berberis vulgaris is the most common species used for ornament, but new species and varieties are frequently introduced, and form important additions to our ornamental shrubbery. For illustration see Plate BALSAM, ETC.

BARBERRY RUST. See RUSTS.

BAR'BER'S ITCH (*Tinea sycosis; sycosis parasitica;* ringworm of the beard). A parasitic disease of the bearded parts of the face, caused by the entrance into hair follicles of a fungus, the *trichophyton*. An eruption appears in the form of a ring, red and scaly, and increasing by the enlarging of the outer limits of the ring. Later the red area swells, and has a 'boggy' feeling to the touch, exudes a little thick mucilaginous fluid on pressure, and is tender. In many cases itching and burning are also among the symptoms. The disease is readily curable. It is sometimes caused by infection from lather-brush, towels, or the barber's hands. It is seldom seen except in cases of individuals who are shaved, and about one-half of the cases occur in men between 20 and 30 years of age.

BAR'BERTON. A mining town of the Vaal River Colony, South Africa, in the District of Lydenburg, about 70 miles west of Lourenço Marques, with which it is connected by rail (Map: Transvaal Colony, H 4). It lies in a mountainous region, at an elevation of 2800 feet above the sea, in the vicinity of the De Kaap gold-fields. Barberton was founded in 1885. Population, about 4000. In the early part of the Boer War of 1899-1902 the British prisoners were confined here by the Boers.

BARBÈS, bär'bĕs', ARMAND (1809-70). A French revolutionist. He was a leader of secret political societies, was at various times imprisoned, and in 1839 was sentenced to death as the main instigator of an attempted insurrection against Louis Philippe. While in prison he wrote *Two Days Under Condemnation of Death*. He was pardoned, and in 1848 was chosen to the Constituent Assembly, but in the same year, with Raspail and others, he was sentenced to life-imprisonment for stirring up an insurrection against the Assembly. When set free he refused to receive pardon, asking to be allowed to return to jail; but this was denied him, and he left the country. Consult La Brugère, *Le Procès Armand Barbès*.

BAR'BET (Fr., from Lat. *barbatus*, bearded). Any bird of the tropical families Capitonidæ or Bucconidæ, so called in reference to the prominence of bristles about the mouth. Those of the former family are scansorial barbets, barbicans, or thickheads; those of the latter, fissirostral barbets, barbacous, or puff-birds. See THICK-HEAD FLY; PUFF-BIRD; and Plate of TROGON, HOOPOE, ETC.

BARBETTE, bär-bĕt' (Fr. dim. of *barbe*, Lat. *barba*, beard). In military fortification, a term applied to the platform on the inner side of a parapet or rampart on which a heavy gun is mounted. It is built at such an elevation that the gun may be fired over the crest of the parapet instead of through an embrasure. In this way the gun may be moved in different directions. In the United States and British navies, the term is commonly used to designate the armored structure surrounding and protecting the bases of guns or turrets, but which is more properly called a *barbette tower*. These towers are almost invariably of circular form, the armor extending down to the protective deck, except when it is protected by the armor on the ship's side, while the supporting framework, somewhat changed in form as it goes down, extends to the inner keel. Inside the tower is the machinery for operating guns and supplying them with ammunition. See FORTIFICATION.

BARBETTE GUN. A gun mounted for firing over a breastwork or parapet, and not through a porthole or embrasure. On board ship guns are mounted *en barbette* in barbette towers. See COAST ARTILLERY; GUNS, NAVAL; and ORDNANCE.

BARBETTE TUR'RET. A revolving tower or turret mounted above a fixed barbette tower. Turrets are now generally oval or ovoidal in plan, and the side in rear of the guns projects beyond the walls of the barbette tower to form the 'overhang.' See TURRET.

BARBEY D'AUREVILLY, bär'bâ' dō're-vē'yē', JULES (1808-89). A French writer, born at Saint Sauveur-le-Vicomte (Manche). He was one of the founders (1858) and editors of the *Réveil*, and for a number of years contributed literary articles to the *Pays*. His works, in both fiction and criticism, are original—sometimes grotesque in flavor. They include *Du dandysme et de George Brummel* (3d ed., 1880); *Les prophètes du passé* (1851); *L'ensorcelée* (1854); *Portraits critiques* (1863); *Le chevalier Des Touches* (1864); and *Goethe et Diderot* (1880).

BAR'BICAN (Low Lat. *barbacana*, *barbicana;* perhaps akin to Ar. *barbakh*, aqueduct, sewer). A fortified advanced work protecting a passage, gate, or postern of a city or fortress, usually at the head of a drawbridge. The barbican was used in all well-fortified places to facilitate sallies or protect a retreat. It was built of wood or earth, or stone, provided with a ditch and often with a flying bridge. Usually it was semicircular. Even temporary camps had large barbicans to mask and protect manœuvres. The permanent examples in stone at Carcassonne (q.v.) are of unusual importance. Sometimes they were closed across their end so as to make it difficult for the enemy to enter the city, even after it had been captured. The famous English castles of Alnwick and Warwick still retain their barbicans. In an assault, the barbican was usually captured before the outer bailey. Sometimes the barbican took the form of a double tower on each side of a gate or bridge, and served as a watch-tower. From the peculiar form of the long, narrow, flaring openings pierced in such works, the term barbican came to be applied to such shaped openings, loopholes, or embrasures, even when they were used in other structures to let in light, to ventilate, or to carry off water from foundations. See Bailey; Bastion; Bastille; and Castle.

BARBIÉ DU BOCAGE, bär'byâ' dụ bô'kȧzh', Jean Dénis (1760-1825). A French geographer. He was born and died in Paris. After holding several important Government positions, he became professor in the Collège de France in 1809, and in 1821 was one of the founders of the French Geographical Society. His best-known works are his historical and geographical atlases. He also wrote, in conjunction with Sainte-Croix, *Mémoires historiques et géographiques sur les pays situés entre la Mer Noire et la Mer Caspienne* (1796).

BARBIER, bär'byâ', Antoine Alexandre (1765-1825). A French bibliographer. He was born at Coulommiers, studied at the Normal School, and took orders, but in 1793 left his curacy, and in 1794 was appointed a member of the commission for the preservation of objects of art and science. He was delegated to collect and distribute to various libraries the valuable books obtained at the time of the Revolution through the suppression of ecclesiastical establishments. He was appointed librarian to the Directory, and was also private librarian to Napoleon I., in which capacity he founded the libraries of Fontainebleau. Compiègne. Saint Cloud, and the Louvre. At the Restoration, he became director of the Crown Library, and continued in that post until 1822. His bibliographic works include *Catalogue des Livres de la Bibliothèque du Conseil d'Etat* (2 vols., Paris, 1801-03); *Dissertation sur Soixante Traductions Françaises de l'Imitation de Jésus-Christ* (1812), and, chiefly, *Dictionnaire des Ouvrages Anonymes et Pseudonymes* (4 vols., 1806-09).

BARBIER, Henri Auguste (1805-82). A French poet and novelist, born in Paris. He is remembered chiefly for his satires, *Les Iambes* (1831). political and social castigations of the predominant types in the bourgeois monarchy of Louis Philippe, though the morals of the aristocracy were not spared. The most famous of them is *La Curée*. Of his other works, *Il Pianto*, dealing with Italy, and *Lazare*, with Ireland. though greatly inferior, rank next in importance. Barbier was elected to the Academy in 1869, and died at Nice, February 12, 1882.

BARBIER DE MEYNARD, bär'byâ' de mȧ'när', Charles Adrien Casimir (1827—). A French Orientalist, born in Marseilles. He was appointed a member of the French Legation to Persia, and afterwards successively became professor of Turkish at the Ecole des Langues Orientales, and professor of Persian (1875) and Arabic (1885) at the Collège de France. His works include: *Dictionnaire géographique, historique et littéraire de la Perse et des contrées adjacentes* (1861); *Tableau littéraire du Khorassan et de la Transoxiane au IVème siècle de l'hégire* (1861); *Dictionnaire turc-français* (1885-87).

BARBIER DE SÉVILLE, bär'byâ' de sâ'vêl' (Fr., barber of Seville). (1) A work by Beaumarchais (q.v.), rejected (1772) as a comic opera, and subsequently given its present form as a comedy. (See Figaro.) (2) A light Italian opera (*Il barbiere di Siviglia*); (a) by Paisiello, with adaptation of Beaumarchais's comedy as the libretto; given in Saint Petersburg in 1780, and in Paris in 1789. (b) By Rossini, with book again adapted from Beaumarchais; it was given in Rome in 1816, and in Paris in 1819. First unpopular, it has become one of the favorite operas.

BARBIERI, bär-byā'rê, Giovanni Francesco. See Guercino.

BARBISON, bär'bê'sôɴ'. A village in the Department of Seine-et-Marne, France, 5 miles northwest of Fontainebleau. It has given its name to a school of French landscape painters. (See Barbison School.) Its picturesque situation and association have made it a favorite resort for artists and tourists.

BARBISON SCHOOL. The name given to the work of a group of painters who repaired to the village of Barbison and its environs, about 1844, when one of the most distinguished of modern French landscape painters. Théodore Rousseau, first settled there. In 1849 Jean François Millet took up his abode at Barbison. Of this school also were Corot, Daubigny, Diaz, Troyon, and others who so influenced the landscape art of France. that the term 'Barbison School' came to signify that coterie of painters who succeeded the romantic revolt of 1830, and went directly to Nature for their inspiration instead of painting studio pictures. Further information about the work of these men is included under their names. Consult Mollett, *The Painters of Barbison* (London, 1890).

BAR'BITON, or **BAR'BITOS** (Gk. *βάρβιτον*, *βάρβιτος*). A special form of the Greek lyre, much used on Lesbos and among the Ionians. It seems to have had a deep tone, and may be the instrument, with a small sounding-board and long arms. which is carried by Alcæus and Sappho on a vase in Munich. See Lyre.

BARBOSA DU BOCAGE, bär-bō'sȧ dụ bô'käzh'. See Boccage, Manoel Maria Barbosa du.

BARBOSA-MACHADO, bär-bō'sȧ-mȧ-shä'dṓ. Diego (1682-1770). A Portuguese bibliographer. He was born in Lisbon; took holy orders in 1724, and received the appointment of Abbot of the Convent of Santo Adriano de Sever. Here he remained until his death engaged in the preparation of a monumental work, which contains biographical notices of all the Portuguese and Brazilian authors. It is called *Bibliotheca Lusitana antiqua e nova, historica, critica e chronologica, na qual se comprehende a noticia dos autores Portuguezzes, e das obras que compuzeram desde o tempo da promulgacão da ley de graça, ate o tempo presente* (4 vols., Lisbon, 1741-52). A summary of this was arranged by Bento José Farinha, *Summario da Bibliotheca Lusitana* (4 vols., Coimbra, 1820).

BARBOU. bär'bōō', Joseph Gérard (1715-1813). The most important representative of the firm of French printers of that name. Of his publications the best-known are to be found in his continuation, in duodecimo, of the series of Latin classics begun by Antoine Coustelier, at the instance of the Àbbé Lenglet Dufresnoy. These volumes of his are still justly noted for their careful text and excellent typography.

BARBOUR, bär'bẽr, Erwin Hinckley. An American geologist. He was born near Oxford, Ohio, and was educated at Miami University and at Yale. He was assistant paleontologist to the United States Geological Survey from 1882 to 1888, and Stone professor of natural history and geology at Iowa College from 1889 to 1891. He became curator of the Nebraska State Museum of Agriculture in 1892, and geologist of the Nebraska State Board of Agriculture in 1893.

BARBOUR, James (1775-1842). An American politician. He was a member of the Virginia Legislature from 1796 to 1812; was Governor of the State for two terms, and was a member of the United States Senate from 1815 to 1825, when he became Secretary of War in the Cabinet of President J. Q. Adams. He was appointed Minister to England in 1828, but was recalled by Jackson in the following year. He presented a bill to establish a United States Bank, was author of the anti-dueling act of Virginia, and presided over the national convention that nominated Harrison and Tyler.

BARBOUR, John (c.1316-c.1395). The first of the early Scottish poets, regarding whom history has not much to record beyond the production of the national epic, entitled *The Brus*, the subject of which is Robert Bruce. The ascertained facts of Barbour's life may thus be summarized: Born about 1316, he was Archdeacon of Aberdeen in 1357, and held that office till his death; in 1357 he traveled into England, accompanied by three scholars, on a visit to Oxford; in 1365 he obtained a passport "to travel through England with six companions on horseback toward Saint Denis and other sacred places;" in 1368 he again received permission to travel through England with two servants and two horses, on his way for scholarly purposes to France; in 1373 he was clerk of audit of the household of King Robert II., and one of the auditors of exchequer; in 1375 his great poem was more than half finished; in 1377 he had a gratuity of £10 from King Robert II.; in 1378 he received from the same prince a perpetual annuity of 20s., which in 1380 he bequeathed to the Dean and Chapter of Aberdeen, under the condition that they should sing a yearly mass for the repose of his soul; in 1381 he had a gift from the Crown of the wardship of a minor, whose estate lay within the parish of which he was rector; in 1383, and again in 1385, he was one of the auditors of exchequer; in 1388 King Robert II. granted him a pension of £10 a year; and he died probably on March 13, 1395. Besides *The Brus*, two other poems have, with reasonable certainty, been assigned to Barbour: *The Legends of the Saints*, and a poem on the Trojan War, of which only fragments remain. *The Brus* is distinguished by great purity and clearness of style, the language and versification contrasting advantageously with those of any contemporary English poet except Chaucer. Barbour's imagery is not rich, but he is seldom other than lively, simple, and energetic. He has depicted, in rough but faithful outline, the life, manners, and deeds of a truly heroic time, and given to his country the first poem in her literature, and the earliest history of her best and greatest king. Consult: *The Brus*, ed. by Skeat for Early English Text Society (London, 1870-89), and for the Scottish Text Society (Edinburgh, 1894); *Legends of the Saints*, ed. by Metcalfe for Scottish Text Society (Edinburgh, 1896); and Horstmann, *Barbour's Legendensammlung, nebst den Fragmenten seines Trojanenkrieges* (Heilbronn, 1881-82).

BARBOUR, Oliver Lorenzo (1811-89). An American lawyer and legal writer. He was born at Cambridge, N. Y., studied law, was in 1832 admitted to the bar, and was reporter of the New York Court of Chancery in 1847-49. From 1848 to 1876 he was reporter of the State Supreme Court. He published *Equity Digests* (1836-41), *Treatise on the Practice of the Court of Chancery* (1843), and many other works.

BARBOUR, Philip Pendleton (1783-1841). An American jurist. He was born in Virginia, and studied law at William and Mary College. From 1812 to 1814 he was a member of the State Legislature, from 1814-21 was in Congress, and later was a judge of the Virginia General Court. Again, from 1827 to 1830, he was in Congress, and from 1836 until his death was an associate justice of the United States Supreme Court. He was a strong Southern partisan on the Missouri Question.

BAR'BOURSVILLE. A town and county-seat of Knox County, Ky., 185 miles southeast of Louisville; on the Cumberland River, and on the Louisville and Nashville Railroad (Map: Kentucky, H 4). The principal industries are agriculture, coal-mining, and lumbering; there are several saw and grist mills. Oil-wells of considerable promise have been drilled, and the country is developing rapidly. Population, in 1890, 1162; in 1900, 1010.

BARBOURSVILLE. A town in Cabell County, W. Va., 8 miles west of Huntington, the county-seat; on the Guyandotte River and on the Chesapeake and Ohio and the Guyandotte Valley railroads. It is the seat of Barboursville College (Methodist Episcopal, South) opened in 1888, and is of historic interest as the scene of a conflict in the Civil War, July, 1861, which terminated in a Federal victory. Settled in 1830, Barboursville was incorporated in 1867, and formerly was the county-seat. Population, in 1900, 429.

BAR'BOX BROTH'ERS. A short story, by Charles Dickens in *All the Year Round* (1866). There is a second part entitled *Barbox Brothers & Co.*

BARBOZA. See Caldas-Barbosa.

BARBUDA, bär-boo͞'dȧ (Portug., island of bearded men). One of the Leeward Islands in the British West Indies, situated 20 miles north of Antigua (q.v.), of which it is a dependency (Map: West Indies, R 6). The island, of coral formation, has an area of 62 square miles, with a generally level surface, which is, to some extent, covered with forests. The main occupation of the inhabitants is cattle-raising. Barbuda has a population of about 600, mostly colored.

BARBUDO, bär-boo͞'dō, or **BARBU**, bär-boo͞'. Names given to the thread-fins of the genus Polydactylus, small fishes of the warmer American seas allied to the sand launce. The commonest species (*Polydactylus virginicus*) is a food-fish of some importance in the West Indies and is illustrated on the Plate of Mullets and Allies.

BAR'BY. A town in the Province of Saxony, Prussia, on the left bank of the Elbe, near the mouth of the Saale, 16 miles southeast of Magdeburg. It has ship-building industries and an agricultural trade. The town is well built, has a mediæval castle, and was the seat of a countship. Population, in 1900, 5137.

BAR'CA, or **BARCE**, bär'sē (Gk. Βάρκη, *Barkē*). An ancient city in Cyrenaica, in the district of Barca, Africa. The ruins are now known as Medinet-el-Merj. It was founded by a Cyrenean colony, about B.C. 554. The Persians captured and pillaged the city about B.C. 510, and many of its people were led off as captives into Bactria. Barca gave its name to the entire surrounding region.

BAR'CA. A Turkish vilayet in the north of Africa, situated in longitude 20° to 25° E., and latitude 29° to 33° N., between Tripoli, Egypt, and the Libyan Desert, and bounded on the north by the Mediterranean Sea (Map: Africa, G 1). It has an estimated area of 20,000 square miles, and a population of about 300,000, consisting mainly of Berbers, Arabs, Turks, and Greeks. It is an arid, elevated plateau, for the most part covered with sand. A range of mountains reaching in Jebel Akhdar an elevation of 3300 feet traverses the northern part from east to west. A fringe of fertile plains of red alluvium on the borders affords good arable and pasture land and contributes to the principal industries—agriculture and cattle-raising. Considerable quantities of grain and cattle are exported. The chief imports are textiles and drugs. The sponge-fisheries are also important. In the time of Cyrus, Barca became a State which proved dangerous to the neighboring State of Cyrene, but within a century it became subject to Egypt. In the Roman period, its inhabitants were noted for their predatory incursions. It was afterwards a province of the Greek Empire, and had declared itself independent when the Arabs invaded and conquered it in 641. It became part of Tripoli, but is now a separate province under Turkish dominion. It is sometimes called by the name of its capital, Bengazi (q.v.).

BARCA (Sp., It., bark). A small two-masted vessel. A *barca-longa* is a large Spanish coasting vessel having pole-masts and lug-sails; the name is also applied to a gunboat. Both terms are used in the Philippine Islands in the senses given.

BARCA, or **BAR'CAS** (Gk. Βάρκας, *Barkas;* Punic, lightning, gleaming; cf. Heb. *barak*, a gleaming, or gleaming sword). A surname which was applied to Hamilcar and other Carthaginian commanders.

BARCAROLLE, bär'kȧ-rōl (It. *barcarolo*, boatman, from *barca*, boat). A species of song peculiar to the gondoliers of Venice. Hence the name is applied to musical compositions of a similar character for voice or pianoforte.

BARCELLONA, bär'chĕl-lō'nȧ. A city in Sicily, on the Longano, 27 miles west of Messina, famous for sulphur baths that are frequented from May to September. The suburb of Pozzo di Gotto is separated from the main town by a small stream, the Fiume di Castro Reale, supposed to be the Longanus of antiquity. The chief commerce is in oil and fish. Population, in 1881, 15,000; in 1901 (commune), 23,493.

BAR'CELO'NA, *Sp. pron* bär'thȧ-lō'nȧ (anciently, *Colonia Faventia Julia Augusta Pia Barcino*). The capital of Catalonia and of the Province of Barcelona, the largest city of Spain, after Madrid, and the most important maritime, commercial, and industrial centre in the kingdom (Map: Spain, G 2). It is situated in latitude 41° 21′ 44″ N., longitude 2° 30′ 32″ E., on the Mediterranean coast, between the mouths of the Llobregat and the Besós, in a fertile and well-populated valley surrounded by hills, 440 miles northeast of Madrid by rail, 310 miles in a direct line. It has a pleasant and equable climate (mean temperature, 61° F.), and a good municipal water-supply. Barcelona consists of the old city, formerly surrounded by walls, which have been converted into promenades, and numerous suburbs of modern architecture containing the various manufacturing establishments to which the city owes a great deal of its importance. The only fortification of Barcelona is the Castillo de Monjuich, situated on an isolated mountain near the city, and provided with large magazines and extensive barracks. In the older portion of the city, bounded by the *Rondas* and the *Salons*, which mark the site of the old walls, the streets, with the exception of the wide Rambla, the Calle de Fernando VII., and the Calle de la Princesa, are narrow and crooked. They are lined with houses most beautiful in design, although of somewhat gloomy coloring. The Rambla, which begins at the Columbus Monument, near the harbor, and ends at the Plaza de Cataluña, is the favorite city promenade, and contains most of the theatres, hotels, and shops. On the northern side of the city is situated the magnificent public park, with its fine avenues, flower-beds, lakes, and several museums, including the Museo de Reproducciones, containing a fine collection of plaster casts. The Cathedral of Barcelona occupies the highest point in the centre of the old city, a site formerly occupied by a Roman temple and a Moorish mosque. It is a magnificent building of Spanish Gothic, founded in the Thirteenth Century, with a spacious nave, ornamented with fine reliefs. Its 26 chapels date chiefly from the Sixteenth and Seventeenth centuries. The Church of Santa Maria del Mar, in late Gothic, has a fine façade decorated with bronze statues and two towers. Among other churches may be mentioned that of San Pedro de las Puellas, dating from the Tenth Century, and the Gothic Church of Santa Maria del Pino.

The secular buildings of Barcelona include the old palace of the counts of Barcelona, containing the archives; the Casa de la Diputación, erected in the Fifteenth Century, and used by the chamber of deputies for the province; and the Casa Consistorial, containing the municipal archives. Among the more modern buildings are the exchange, the custom-house, and the palace of justice. As the capital of Catalonia, Barcelona is the seat of the Captain-General, a supreme court, and a bishop. It has a large number of nunneries and monasteries, to which are attached numerous educational and benevolent institutions. The University of Barcelona was founded in 1450, partly removed in 1714 to Cervera, and again established at Barcelona in 1837. It has faculties of philosophy, law, natural sciences, mathematics, medicine, and pharmacy, with a total attendance of over 3000 students. Other educational institutions of Barcelona include schools of architecture, engineering, commerce, agriculture, war, theology, pedagogy, etc. The elementary education is under the control of the municipality, and is compulsory—but only in theory. The Provincial and the University libraries have together over 154,000 volumes, and the general archives of the Kings of Aragon number nearly 4,000,000 documents. The Palacio de Bellas Artes, situated in the park, is used for exhibitions of paintings and sculptures. Barcelona has a considerable number of theatres, among which the Gran Teatro de Liceo is the largest, with a seating capacity of 4000. There is also a bull-ring, with a seating capacity of 14,500.

Barcelona is one of the largest cotton-manufacturing centres of Spain. Its other important manufactures are woolen and silk fabrics, metal articles, paper, glass, leather, and chemicals. Barcelona's commercial importance dates from the Middle Ages. The shipping, including the coast traffic, exceeds 3,000,000 tons per annum. The total commerce of the port amounted in 1898 to 361,000,000 pesetas (over $69,000,000), of which 220,000,000 pesetas (more than $42,000,000) represented imports.

The exports consist chiefly of wine, southern fruits, and manufactures. The imports are mostly grain from Russia and the United States, cotton from the United States, hemp, metal products, and foodstuffs. Barcelona has direct communication with Germany, Morocco, Great Britain, and the West Indies. It is the seat of a United States consulate, and has consular representatives from every country of importance. Municipal enterprise has improved the harbor considerably since 1880 by means of extensive moles and lighthouses.

In its administration Barcelona is the most autonomous municipality in Spain. It is governed by a council, elected by all citizens above the age of 25, who have resided not less than 2 years in the commune. The term of office is 4 years, and the council is presided over by an *alcalde*, chosen by the members from their midst. The council has charge of all the departments of municipal administration, and even exercises supervision over private charitable institutions. The death-rate of Barcelona is below the average for the entire country, and its sanitary conditions are improving rapidly. The city is lighted by gas and electricity, supplied by private companies. The general progress of Barcelona was accompanied by a corresponding increase of population during the last quarter of the Nineteenth Century. Population, in 1877, 249,000; in 1887, 272,481; in 1897 (after large annexation of suburbs and manufacturing quarters), 510,000. Consult Montpalais, *Memorias Históricas de Barcelona* (Madrid, 1779-92).

Barcelona was founded by the Phœnicians, and is said to have derived its early name of Barcino from Hamilcar Barca, who made it one of the centres of Carthaginian power in the Peninsula. An important city under the Romans, Goths, and Saracens, Barcelona in the latter half of the Ninth Century became an independent sovereignty, under a Christian chief of its own, whose descendants continued to govern it (being known as the Counts of Barcelona) until 1137, when Catalonia, by the marriage of its prince, Raymond Berengar, with the heiress to the crown of Aragon, became a part of that kingdom. During the Middle Ages, Barcelona became a flourishing seaport, rivaled in the Mediterranean by Genoa only. To its commercial code, framed in the Thirteenth Century, much deference was paid by the whole of Europe. In 1640 Barcelona revolted from Philip IV., but in spite of the support of the French arms, it was forced to resume its allegiance in 1652. In 1705 the fortress of Monjuich was surprised and captured by Lord Peterborough (q.v.), and the city surrendered shortly afterwards. In 1714, after a most heroic defense, it was stormed by the Duke of Berwick, and given over to fire and sword. The French held it from 1808 to 1814. During the Nineteenth Century Barcelona took an active share in the political dissensions of the Spanish nation. It was the centre both of reactionary and radical agitations, the scene of socialist and Carlist uprisings and of anarchist activity, and the stronghold of Separatism.

BARCELONA. The capital of the State of Barcelona, Venezuela, on the Neveri River, 3 miles from the Atlantic coast; 150 miles east of Carácas (Map: Venezuela, E 1). It is connected with the port of Guanta by a railroad. The city is at the northern limits of the fertile llanos, and is regularly laid out, but is rather poorly built and unhealthful. There are, however, a few fine buildings, such as the Government House, the Masonic Temple, and the theatre, market, hospitals, churches, and educational institutions. The city has coal and salt mines in the vicinity, and is the seat of an extensive commerce. Barcelona was settled in 1638 at the foot of the Cerro Santo, but in 1671 the settlement was removed to the present site of the city. It was the capital of the former State of Barcelona until 1881, when it became the capital of the State of Bermúdez, which was subsequently divided into the States of Barcelona and Sucre. The city formerly had a much larger population than at present, but suffered severely in the War of Independence. Population, in 1891, 12,785; in 1899, about 9000.

BAR'CLAY, Alexander (c.1475-1552). A poet and satirist. He was born about 1475, but whether in England or Scotland is not certain. He studied at one or both of the English universities, and then obtained, through his patron, Bishop Cornish, an appointment as priest in the College of Saint Mary Ottery, in Devonshire. He afterwards became a monk of the Benedictine Monastery of Ely, where he remained until its suppression in 1539. He died in June, 1552, six weeks after he had been presented to the rectory of All-Hallows, London. His claim to notice rests chiefly upon his famous poem, *The Shyp of Folys of the Worlde*—partly a translation, and partly an imitation, of the German *Narrenschiff*, originally by Sebastian Brandt—printed by Pynson in 1509, and since often reprinted. Barclay, however, knew nothing of the original, but founded his translation on a Latin version by Jacob Locher, entitled *Stultifera Navis*. The poem is interesting as showing the manners and customs of the times satirized. He published several works besides; among others, *The Myrrour of Good Maners*, *The Castell of Laboure*, *The Egloges*, the first eclogues that appeared in the English language; and also made a translation of Sallust's *History of the Jugurthine War*. In his lifetime he was admired for his wit and eloquence, and his writings exhibit a refinement not common in that age. Consult Barclay, ed. Jamieson, *The Shyp of Folys* (Edinburgh, 1874).

BARCLAY, John (1582-1621). A Scotch poet and satirist. He was born January 28, 1582, at Pont-à-Mousson, in Lorraine, where his father, William Barclay, a Scotchman, was professor of civil law. His mother was a Frenchwoman, but Barclay always considered himself a Scotchman. It has been said that he was educated by the Jesuits, who tried to induce him to enter their order. Whether this is so or not, he had great antipathy to them. On the accession of James to the English throne (1603), Barclay came to London, where he published the first part of the *Satyricon*, a politico-satirical romance, chiefly directed against the Jesuits and the Duke of Lorraine. In 1607 a second part appeared in Paris. This was followed by the *Apologia* (1611), and *Icon Animorum* (1614), which may be regarded as further continuations of the *Satyricon*. In the meantime Barclay had published a collection of graceful Latin poems bearing the title of *Sylvæ* (1606). In 1615 he left England and went to Rome, where he died August 15, 1621. In the same year his best-known work, the *Argenis*, appeared posthumously in Paris. It was written in Latin, and has been translated into several languages. There are no fewer than three translations into English; the last appeared in 1772. It is a political allegory, containing clever allusions to the state of Europe, more particularly of France, during the time of the League. *Argenis* was admired by Cowper and Coleridge. Consult Dukas, *Etude bibliographique et littéraire sur le Satyricon* (Paris, 1880).

BARCLAY, John (1758-1826). A Scottish anatomist. He prepared for the ministry, but became interested in natural science, and devoted his life to the study of anatomy. He published, in 1803, *A New Anatomical Nomenclature*, and in 1808 a treatise on the muscular motions of the human body. In 1812 appeared his *Description of the Arteries of the Human Body*, a work of vast labor and accurate observation. In 1825, not long before his death, he published *An Inquiry Into the Opinions, Ancient and Modern, Concerning Life and Organization.* He died at Edinburgh, leaving to the Royal College of Surgeons in Edinburgh his admirable anatomical collection, for the reception of which a suitable hall was erected and named the "Barclayan Museum."

BARCLAY, John (1734-98). A Scottish divine—the founder of a sect in the Scottish Church called Barclayites, or Bereans—a name derived from the Acts of the Apostles, xvii. 2. He was assistant minister at Fettercairn, where he attracted crowds by his novel doctrines, but the Presbytery dismissed him from his position. The General Assembly sustained the Presbytery, whereupon Barclay left the Church, but continued to preach in Edinburgh, London, and other cities. (See Bereans.) Barclay's *Works* were published with a memoir (1852).

BARCLAY, Robert (1648-90). A Scottish divine; the celebrated apologist of the Quakers. He was born on December 23, 1648, at Gordonstown, in Morayshire, Scotland. His father was the son of David Barclay, of Mathers, the representative of an old Scoto-Norman family, which traced itself through fifteen intervening generations to Walter de Berkeley, who acquired a settlement in Scotland about the middle of the Twelfth Century; his mother was the daughter of Sir Robert Gordon, the premier baronet of Nova Scotia, and historian of the house of Sutherland. Young Barclay received the rudiments of learning in his native country, and was afterwards sent to the Scotch College at Paris, of which his uncle was rector. Here he made rapid progress in his studies, and excited the admiration of his preceptors, as well as of his relative, who offered to make him his heir if he would remain in France, and formally adopt the Roman Catholic religion, to the ceremonies of which he had been habituated during his residence there. This, however, Barclay refused to do; and in compliance with the wish which his mother had expressed on her death-bed, he returned home in 1664. Though only 16, Barclay was an excellent scholar, and could speak Latin with wonderful fluency and correctness. In 1666 his father became a Friend, and the next year Barclay followed him. He states in his *Treatise on Universal Love*, that his 'first education fell among the strictest sort of Calvinists,' those of his country 'surpassing in the heat of zeal not only Geneva, from whence they derive their pedigree, but all the other so-called Reformed Churches;' that shortly afterwards, his transition to France had thrown him among the opposite 'sect of Papists,' whom, after a time, he found to be no less deficient in charity than the other; and that, consequently, he had refrained from joining any, though he had listened to several. The ultimate effect of this was to liberalize his mind, by convincing him of the folly and wickedness of religious strife. In both Calvinists and Catholics, he found an absence of 'the principles of love,' 'a straitness of doctrine,' and a 'practice of persecution,' which offended his idea of Christianity, as well as his gentle and generous nature. He therefore allied himself gladly to the Friends, whose distinguishing feature was their charity and pure simplicity of Christian life, and soon became one of their most devoted adherents and their ablest advocate. In the course of his life he made several excursions into England, Holland, and Germany, earnestly propagating his peaceful views wherever he went, and occasionally enjoying the companionship of William Penn.

His first publication was *Truth Cleared of Calumnies.* It appeared in 1670, and was intended as a refutation of the charges—many of them notoriously false—made against the new sect. In 1673 appeared *A Catechism and Confession of Faith*, the answers to the questions being—to avoid theological dogmatism—in the words of Scripture. This was followed by *The Anarchy of the Ranters*, in 1676, and the same year he published his *magnum opus*, elaborately entitled *An Apology for the True Christian Divinity, as the same is Held forth and Preached by the People called in Scorn Quakers*, which he had previously sent forth, and upon which he held a public disputation at Aberdeen with some divinity students (March 14, 1675). It contains a statement and defense of 15 religious propositions peculiar to the Friends. The leading doctrine which runs through the whole book is, that divine truth is made known to us not by logical investigation, but by intuition or immediate revelation; and that the faculty, if it can be technically defined, by which such intuition is rendered possible, is the 'internal light,' the source of which is God, or, more properly Christ, 'who is the light that lighteth every man that cometh into the world.' In 1677 appeared his *Treatise on Universal Love*. It was the first of that long series of noble and gentle remonstrances against the criminality of war that has so honorably distinguished the Society of Friends. It was addressed to the ambassadors of the several princes of Europe, met at Nimeguen, and was composed in prison at Ury, near the city of Aberdeen, where he, his father, and many other Friends were confined for their faith's sake. He was released after five months, and during the latter part of his life enjoyed court favor unmolested. In 1683 the Duke of York gave the Friends the patent of the Province of East Jersey, and Barclay was made nominal governor. He never came to America, however. In 1686 he published his last work, which was a defense of the doctrine of 'immediate revelation.' He died at Ury, October 3, 1690. His estate remained in the possession of his descendants till the death, in 1854, of Robert Barclay Allardice, better known as Captain Barclay, the famous pedestrian. 'The Apologist's Study,' which remained much as he left it, was long an object of pilgrimage with members of the Society of Friends; but it was destroyed a few years ago, when the old house of Ury was pulled down. Barclay's works were published in a collected edition entitled *Truth Triumphant* (London, 1692; later edition, 1717-18, 3 vols.). For his biography, consult Wilson Armistead (Manchester, 1850). His *Apology* and *Catechism* and *Treatise on Church Government* (formerly called, as above, *The Anarchy of the Ranters*) have been reprinted by the Friends' Book Store (Philadelphia).

BARCLAY, Robert H. (?-1837). A Scottish naval officer. He served at Trafalgar, and in 1813 fitted out the English fleet on Lake Erie. In command of this fleet, he was defeated in the battle of Lake Erie, September 10, by Commodore O. H. Perry (q.v.). During the battle he was seriously wounded. Subsequently he was tried by court-martial for the surrender of his fleet, but was acquitted.

BARCLAY DE TOLLY, bär-klī′ de tô-lē′, Michael, Prince (1761-1818). A Russian general. He was descended from an old Scotch family settled in Livonia, and entered a Russian regiment of cuirassiers, with the rank of sergeant. He fought with great bravery in the Turkish War of 1788-89, in the campaign against Sweden in 1790, and in those against Poland in 1792 and 1794. In the year 1806, at Pultusk, as major-general, he commanded Bennigsen's advance-guard. He was wounded at the battle of Eylau, in 1807. In 1808 he distinguished himself in Finland, and in 1809 he led a force across the frozen Gulf of Bothnia to Sweden. Although hated by the Russian national party as a foreigner, he was appointed Minister of War by the Emperor Alexander in 1810—an office which he held till 1813. In 1812 he was made commander-in-chief of the Army of the West. His retreat to Smolensk, and the loss of the battle fought there on the 17th of August, raised the hatred of the Russian national party to a greater height than ever, and he was obliged to yield the chief command to Kutusoff. Barclay's Fabian tactics, although extremely unpopular with the mass of Russians, in the end brought about the destruction of Napoleon. At the battle of the Moskva or Borodino, he commanded the right wing. After the death of Kutusoff he again rose to prominence, did brilliant service in the battle of Bautzen (1813), and was once more placed in command of the army. He afterwards took part in the battles of Dresden, Culm, and Leipzig. He was made prince and field-marshal. He died at Insterburg, in East Prussia.

BAR′CLAY SOUND. An inlet on the west coast of Vancouver Island, British Columbia, Canada. It extends eastward for about 35 miles, and is continued inland by the Alberni Canal, which drains the Great Central, Sproats, and Nahmint lakes. The northern and southern extremities of the Sound are called respectively Cape Beale, marked by a lighthouse, and Amphitrite Point. Broken Group and several other islands are in its waters. Deposits of iron-bearing ores exist on its shores.

BAR′-COCH′BA, Simon. The leader of the Jews in their great insurrection against the Romans, under the Emperor Hadrian, from A.D. 132 to 135. Hadrian's attempt to Romanize Judea through the transformation of Jerusalem into a pagan city, and the gradual obliteration of Jewish customs, had awakened the fanatic zeal of the people all over the Empire. Between A.D. 115 and 118, the Jews rose in revolt in Cyrene, Egypt, Cyprus, and Mesopotamia, while in Palestine only the influence of the aged Joshua, the Taanite, retarded the outbreak. Under the inspiration of Akiba, the successor of Joshua, secret preparations were begun for a rising of the entire nation. At the head of the movement stood Simon Bar Cosiba (that is, of the town of Kosiba) who assumed the name of Bar-cochba, or, 'son of the star,' pretending that the prophecy was to be fulfilled in him, "There shall come a star out of Jacob" (Num. xxiv. 17). From all over the Orient, Jews thronged to join his armies, which, at the height of his power, numbered no less than 400,000 men. He fought at first with great success against the Romans, and even obliged them to evacuate Jerusalem, where he was proclaimed King, and coins were struck to commemorate the resurrection of the Jewish State (A.D. 132). The war spread over all the country of Palestine, and 50 towns, besides many villages and hamlets, came into the possession of the Jews. But on the arrival of Hadrian's general, Julius Severus, Jerusalem was retaken; and in August, 135, Bethar, the last strong fortress held by the Jews, was stormed by the Romans after a siege of nearly a year. According to Dio Cassius half a million of Jews perished in the assault and the massacre that followed, and among them fell Bar-cochba. After the war, many men were executed, thousands of women and children were sold into slavery, and cruel edicts were issued against the survivors. From this last struggle dates the final dispersion of the Jews over the face of the earth. The holy city was razed to the ground and rebuilt under another name. For a detailed account of the struggle, consult: Münter, *Der jüdische Krieg unter den Kaisern Trajan und Hadrian* (Altona, 1821); Schwarz, *Der Bar-Kochbaische Aufstand* (Brünn, 1885).

BARD. A village in Northern Italy, on the Dora Baltea River, and the Turin-Aosta Railway, 51 miles north of Turin (Map: Italy, B 2). Near it and over the railway tunnel towers Fort Bard, which commands the road over the Great and Little Saint Bernhard into the plains of Piedmont. It was seized by the French during the War of the Spanish Succession in 1704, and in 1800 was destroyed by them after it had held Napoleon in check for a week; it was afterwards rebuilt. Population (commune), in 1881, 437; in 1901, 425.

BARD (Irish *bard*, Welsh *bardd*, Breton *barz*). A name commonly given to poets and singers among the Celtic peoples, and mentioned by classical historians as early as the Second Century B.C. The bards disappeared early among the Gauls of the Continent; at all events, not much is known to us of their activity. But among the insular Celts they formed an important social class throughout the Middle Ages, and under modified conditions, the order exists to this day.

In the old Welsh laws, bards were recognized as important members of the community, with special rights and duties. They were organized in some fashion into a separate order, and it is traditionally believed that Gruffydd ap Kynan, King of Gwynedd, made rules for their government. But on this last point there is no satisfactory proof. It should be also said that there is no evidence at all for the claim that the bardic organization of the Twelfth Century was a survival of the ancient Druidic hierarchy. Mr. Stephens, in his *Literature of the Kymry*, has made it clear that the Druidism of the Middle Ages was confined to the bards, and was of very recent origin; and the Druidism of the modern *Gorsedd* appears to be a later development still. The writings of the Welsh bards, which dealt with a large variety of subjects, both secular and religious, are treated elsewhere in the article on Welsh Language and Literature. The order of bards is still regularly maintained in Wales in connection with the Druids and ovates.

In Ireland, the rank and privileges of poets were not dissimilar to those established in Wales. But the name *bard* was at first applied in Irish only to the lower order of popular rhymesters, while the poets of the schools were known as *filid* (singular *fili*). This distinction disappeared, however, in the course of time, and the name *bard* came to be applied to all poets in Ireland as it was in Wales. Professional bardic schools were maintained down through the Seventeenth Century, and the old classical metres were taught in them to the end. (See the article on Irish Literature.) But English rule was always unfavorable to the bards, and they practically disappeared in the course of the Eighteenth Century.

In Scotland, the name 'bard' has been applied freely to poets down to the present time, but there does not appear to have been any regular bardic organization in the modern period.

Bibliography. Classical citations are brought together in Holder's *Altceltischer Sprachschatz* (Leipzig, 1896). Consult also, for the Welsh bards: Walter, *Das alte Wales* (Bonn, 1859); Stephens, *Literature of the Kymry* (London, 1873). For the Irish bards: Thurneysen, *Mittelirischen Verslehren*, in Stokes and Windisch's *Irische Texte*, Vol. III. (Leipzig, 1880-1900); Douglas Hyde, *A Literary History of Ireland* (New York, 1899). Among older treatises, Jones, *Relics of the Welsh Bards* (London, 1784), and Walker, *Memoirs of the Irish Bards* (London, 1786), may be cited.

BARD, or **BARD'ING** (Sp., Port. *albarda*, pack-saddle, from Ar. *al-barda'ah*, a woolen pad placed under the saddle). The armor used for the protection of a horse. See Chamfron.

BARD, Samuel (1742-1821). An American physician. He was born in Philadelphia and was educated at Columbia College and the Edinburgh Medical School. He organized the medical school at Columbia College, and became dean of the faculty. While New York was the seat of the Federal Government, he was Washington's family physician. In 1813 he became president of the College of Physicians and Surgeons in New York. His published works comprise a study of the diseases of sheep, *The Shepherd's Guide* (1807); a treatise on *Angina Suffocativa*, and a *Manual of Midwifery* (1807).

BARDAISAN, bär'dī-sän'. See Bardesanes.

BARDELEBEN, bär'de-lā'ben, Adolf von (1819-95). A German surgeon, born at Frankfort-on-the-Oder. He studied medicine in Germany and in France, and in 1849 became professor of surgery at the University of Greifswald. During the War of 1866, he acted as surgeon-general, and in 1868 became professor of surgery in the University of Berlin. In 1870 he again acted as consulting military surgeon. His published works include an excellent *Lehrbuch der Chirurgie und Operationslehre* (8th ed., 4 vols., 1879-82).

BARDELL', Mrs. A widow in Dickens's *Pickwick Papers* (q.v.). She is plaintiff in the famous case of Bardell *v.* Pickwick. After the trial, she is thrown into the Fleet Prison for inability to pay her lawyer's fees. See Dodson and Fogg.

BARDESANES, bär'de-sā'nēz, or **BARDAISAN** (son of Daisan—a river) (154-c.223). A Syrian Christian poet and theologian. He was born at Edessa, of a good family, and lived for a time at the court of the Abgars. Our information concerning him is not extensive, and only fragments of his many writings have survived, but we know that he was a very influential figure in the Syrian Church. He died at Edessa in A.D. 223. It was chiefly through his efforts that Christianity was first introduced into Edessa, which soon became an important theological centre. He fled into Armenia when Edessa was taken by Caracalla (A.D. 217), but returned soon afterwards. Writers like Eusebius and Jerome refer to Bardesanes in high terms, although the former represents him as having been for a time a Valentinian Gnostic (see Valentinus; Gnosticism). He popularized his views in the form of hymns, 150 in number, which were widely used and which justify us in regarding Bardesanes as one of the fathers of Christian hymnology. It is uncertain how much his son, Harmonius, contributed toward this enrichment of worship, but some ancient authorities rate his services very high. Ephraim, the Syrian, an orthodox writer of the Fourth Century, was alarmed at the influence these hymns still exerted in his day, so he composed others in their place, using Bardesanes as a model, but inserting nothing that was not strictly Catholic. It is difficult to decide just how far Bardesanes's teachings diverged from orthodoxy. He himself denied the charge of polytheism which was brought against him.

The book of *Laws of Countries*—Cureton, *Spicilegium Syriacum* (London, 1855), and the *Ante-Nicene Fathers*, viii. 723 ff. (New York, 1895)—is not the work of Bardesanes, as some have thought, but comes from one of his school and reflects his views. For the early references to Bardesanes consult: Harnack, *Geschichte der altchristlichen Litteratur*, Vol. I. (Leipzig, 1893); for monographs on Bardesanes (in German), Hahn (1819); Merx (1863); and Hilgenfeld (1864). Consult in general, Hort, "Bardaisan," in Smith and Wace, *Dictionary of Christian Biography* (London, 1887).

BARDI, bär′dė, BARDODI. A blind old scholar in George Eliot's novel, *Romola*. He is the father of the heroine.

BARD OF A′VON. A frequent title of Shakespeare, from his home at Stratford-on-Avon.

BAR′DOLPH. One of Falstaff's followers in Shakespeare's *Henry IV.*, *Henry V.*, and *The Merry Wives of Windsor*. He is, first, corporal, then lieutenant in his leader's 'ragged regiment,' everywhere conspicuous for his red nose.

BARDOUX, bär′dōō′, AGÉNOR, pen-name Agénor Brady (1829-97). A French politician and author, born at Bourges. He studied law in Paris, and in 1871 was elected to the National Assembly. In 1876 he was elected to the Chamber of Deputies, and from 1877 to 1879 was Minister of Public Instruction. He was elected a permanent Senator in 1882. He wrote *Les légistes et leur influence sur la société française* (1877), *Le comte de Montlosier et le gallicanisme* (1881), *La bourgeoisie française* (1886), *Chateaubriand* (1893), and *Guizot* (1894).

BARDOWIEK, bär′dō-vēk. A town in the Province of Hanover, Prussia, on the Ilmenau River, three miles north of Lüneburg. In 1189, when it was destroyed by Henri the Lion, it ranked as the principal commercial centre of Northern Germany. Ruins of a cathedral of splendid proportions exist, incorporated with a Fourteenth-Century Gothic church. Population, in 1900, 2002.

BARD′SEN, IVAR (c.1300-c.1350). A Greenland magistrate. He was born in Oster Bygd, or the East District of Greenland, and held the position of steward under the Bishop of Gardar. In 1339 he was sent with several vessels to relieve the sister colony of Vester Bygd, or the West District, which had been invaded by the Eskimos. The manuscript of his account of this expedition, with sailing directions, was found many years later in the archives at Copenhagen, and was subsequently translated into various languages. The first English translation seems to have been made for Henry Hudson. Danish, Latin, and English versions may be found in Major's *Voyages of the Venetian Brothers, N. and A. Zeno* (1873), and an English version, with the original text, was published by the Hakluyt Society in 1873. Consult B. F. De Costa, *Sailing Directions of Henry Hudson, prepared for His Use in 1608 from the Old Danish of Ivar Bardsen* (Albany, 1869).

BARDS′TOWN. A city and county-seat of Nelson County, Ky., 39 miles south by east of Louisville; on the Louisville and Nashville Railroad (Map: Kentucky, F 3). It contains the Nelson Normal and High School, the Bardstown Institute (co-educational), and Saint Joseph's Orphanage (Roman Catholic). The city is a shipping point for hogs, cattle, grain, and whisky, and has distilleries, flouring and sawmills, cooperage works, and a wagon factory. Population, in 1890, 1524; in 1900, 1711.

BARDWAN, bûrd-wän′ (Pers., formerly *Wardbamana*, the thriving, growing one). A city on the Damoda River, in the District and Division of Bardwan, Bengal, British India, on the Grand Trunk Railroad from the Hugli to the Northwest Provinces, in latitude 23° 12′ N., and longitude 87° 56′ E., 74 miles from Calcutta (Map: India, E 4). It is a miserable place—an aggregate of second-rate suburbs. It contains numerous temples and a large palace. Population, 34,500. The Division of Bardwan has an area of 13,850 square miles. Population, in 1891, 7,689,300; in 1901, 8,245,000.

BAREA, bä′rā-ȧ (Abyss., slaves). The name of a negro tribe living in the mountains north of Abyssinia. They have suffered greatly from the continual raids of slave-traders, and are now much reduced in number. An account of this people is given in Munzinger's *Ostafrikanische Studien* (Schaffhausen, 1864), and a grammar of their language was published (Vienna, 1874) by Reinisch, who utilized Munzinger's manuscript collections. See AFRICAN LANGUAGES.

BARE′BONES, or **BARBON,** PRAISE-GOD (c.1596-1679). A London tanner and fanatical member of the Parliament of 1653, which became known by his name. In 1659 he headed a procession of people to protest against the restoration of Charles II., and in consequence spent some time in the Tower in 1662. He had been chosen minister of a Baptist congregation shortly after 1630, and became very popular as a preacher.

BAREBONES PAR′LIAMENT. A name in derision applied to Cromwell's 'Assembly of Nominees,' from one of its members, the leather-merchant, Praise-God Barebones. This Parliament was composed of 140 members selected by the General-in-Chief and the Council of the Army from lists of nominees submitted by the Congregational churches in each county. It met on July 4, 1653; and Cromwell, in a long speech, impressed upon its members their responsibility as godly men. It was expected, apparently, to perform the functions of a kind of constituent convention, preparing the way for the election of a regular Parliament, into whose hands it was to resign its authority. Much ridicule has been cast upon it for its alleged unpractical character. Its attempt to abolish tithes and the Court of Chancery, without providing proper substitutes, has been especially criticised. As a matter of fact, it was a very respectable body, containing many able men. Several very wise measures were enacted. Among these was an ordinance providing for the civil marriage celebration before justices of the peace, and for civil marriage registration by elected parish registers. Its provisions were in harmony with the contemporary laws of the New England Colonies, and anticipated the essential principles of the present English system by nearly 200 years. But the Assembly attempted constitutional legislation which Cromwell regarded as beyond its province; and so, on December 12, 1653, the majority of its members placed their resignation in his hands. Consult: Carlyle, *Cromwell's Letters and Speeches*, Vol. II. (New York, 1874); Green, *History of England*, Vol. III. (New York, 1879); Inderwick, *The Interregnum* (London, 1891); Gardiner, *Constitutional Documents* (Oxford, 1889); and especially id., *History of the Commonwealth and Protectorate*, Vol. II. (London, New York, and Bombay, 1897).

BARE'FOOT'ED (in Lat. *discalceati*, shoeless). An appellation given to certain monks and nuns who abstain from wearing any covering on the feet, either entirely (as the Alcantarines, who originated at Placentia, in Spain, in 1540), or for a specified period of the year (as the nuns of Our Lady of Calvary); or who, instead of shoes, wear merely sandals, i.e. soles of wood, leather, rope, or straw fastened by thongs. They do not constitute a separate order in the Roman Catholic Church, but are to be found as representing a higher grade of asceticism with more or less severity of observance, among most of the orders. Carmelites, Franciscans, Augustines, Eremites, Capuchins, etc. This form of religious austerity is to be traced generally to the custom which prevailed among the Jews and Romans of putting off their shoes on the occurrence of public calamities, that in this condition of mourning and humiliation they might implore the Divine Being for deliverance; but perhaps more particularly to the command which Christ gave his disciples (Matt. x. 10; Luke x. 4).

BARÈGE, bȧ'râzh'. A mixed tissue adapted for women's dresses, called in France *crêpe-de-barège*. The name is derived from the valley of Barèges, where they were first manufactured, the seat of the manufacture at present being at Bagnères de Bigorre. Bareges are usually a mixture of silk and worsted; an inferior kind being composed of cotton and worsted. They vary in color, and are sometimes light in tint, with printed patterns. All are of a slight fabric for summer wear. The best are manufactured in France.

BARÈGES, or **BARÈGES-AUX-BAINS**, ō'bäN'. A watering-place in the department of Hautes-Pyrénées, France, picturesquely situated in the valley of the river Bastan, 4000 feet above the sea, 24 miles south of Tarbes. It consists of a single street of some 80 houses, running along the narrow, rugged glen. The springs are considered efficacious in rheumatism, scrofula, and old wounds. It is annually visited by about 4000 invalids. The bath establishment is a fine marble building. Other prominent institutions are the Military Hospital and the Ecclesiastical Charity Hospital of Sainte Eugénie.

BAREILLY, bȧ-rā'lē, or **BARELI**. The capital of the Bareli District in the Rohilkhund Division of the Northwest Provinces, British India (Map: India, C 3). It is in latitude 28° 23' N., and longitude 79° 28' E., 152 miles east of Delhi. It is pleasantly situated in a well-wooded country on the left bank of the Juá, an affluent of the western Ramgdanga, but possesses no architectural beauty. Besides a brisk and lucrative commerce in grain, cotton, and sugar, the octroi on which is the chief source of municipal revenue, it has considerable manufactures, more particularly of ornamental chairs and tables. It is the seat of a well-attended Government college. Bareilly became notorious during the Mutiny of 1857 by the massacre of Europeans on the 31st of May. It was recaptured by Sir Colin Campbell, afterwards Lord Clyde, in May, 1858. Population, in 1891, 121,000; in 1901, 117,400.

BARELI. See Bareilly.

BARENTS, bä'rents, Willem (?-1597). A Dutch explorer of the Arctic Ocean. He sailed from Holland in June, 1594, to find a northeast route to China, and explored a great part of Nova Zembla. In May, 1596, he went as pilot of two ships sent out by the city of Amsterdam. At Spitzbergen the ships separated and Barents guided one of them around Nova Zembla. At Ice Haven it was frozen in, and here Barents and his companions were forced to remain for months, suffering terribly from the intense cold. Many of the crew died in the course of the winter. On June 14, 1597, the survivors started in open boats for the mainland. Barents and four of his companions soon succumbed, but the rest reached Lapland, where they found the other vessel, and were rescued. Interesting relics of this expedition were discovered in 1871 by Captain Carlsen; they were found undisturbed after a lapse of 274 years. Consult Gerrit de Veer, *The Three Voyages of Willem Barents*, published by the Hakluyt Society (London, 1876).

BARÈRE DE VIEUZAC, bȧ'râr' de vyē'zȧk', Bertrand (1755-1841). A member of the French National Convention. He was born at Tarbes and practiced law at Toulouse. After acting as deputy in the States-General and editing a daily Revolutionary paper, *Le Point du Jour*, he was sent in 1792 to the National Convention by the Department of Hautes-Pyrénées. He is said to have been personally in favor of moderate action, but he was easily overawed by the influence of the party of the Mountain, and led away by his desire for leadership and love of applause. His eloquence was so poetical that he came to be known as 'the Anacreon of the guillotine.' He was reporter from the committee on war, where he sat with Danton, and presided over the Convention when sentence was passed on Louis XVI., rejecting the King's appeal to the people, with the words, "The law is for death, and I am here only as the organ of the law." His inborn mildness warring with the instinct of self-preservation made him alternately a supporter of merciful measures and a bloodthirsty advocate of the guillotine; but his entire public career indicates a man of essential cowardice, far more selfish than patriotic. After the fall of Robespierre, whom he helped to overthrow, Barère proposed the continuation of the Revolutionary Tribunal, but was denounced, impeached, and sentenced to transportation. He was saved, however, by the general amnesty after the 18th Brumaire. Elected as deputy during the Hundred Days, he was banished after the second Restoration, and devoted himself to literary work at Brussels, till the Revolution of July permitted his return. In 1832 he was once more elected as a deputy from the Hautes-Pyrénées. His election, however, was annulled on account of errors in form, whereupon the Government gave him an official position in his Department, which he held till 1840. His *Mémoires*, which were published at Paris in 1834, have been translated into English by Payne (London, 1896).

BARETTA-WORMS, bá′rē′tá′ vōrms′ Blanche Rose Marie Hélène (1856—). A French actress, member of the Comédie Française. She was born at Avignon and entered the Conservatoire when only twelve years old, leaving it in 1872, with a second prize in comedy. After engagements at the Odéon and the Vaudeville, she made her début at the Théâtre Français in 1875, as Henriette in *Les femmes savantes*, and the next year became a member of the company. Among her successes there have been her performances in *Le mariage de Victorine*, *La maîtresse légitime*, *Les corbeaux*, *Antigone*, *Le gendre de Monsieur Poirier*, and *Le jeu de l'amour et du hasard*. She was married to M. Worms, a colleague at the Théâtre, in 1883.

BARETTI, bä-rĕt′tê, Giuseppe Marc' Antonio (1719-89). An Italian critic, endeared to Englishmen as a friend of Johnson and Reynolds, and an imitator of the *Spectator*. He was born in Turin; his father destined him for the law, but at the age of 16 he fled from home, and for many years led a roving life, supporting himself by his pen. In 1751 he established himself as a teacher of Italian in London, where he secured an appointment as secretary to the Royal Academy of Painting, and thus came in contact with Johnson, Garrick, and other members of their set. In 1757 he published his *Italian Library*, giving accounts of the most eminent Italian authors and their works, and five years later issued his *Lettere famigliari*, describing his travels through Spain, Portugal, and southern France. Returning to Italy, he started a critical journal, the *Frusta letteraria*, or *Literary Scourge*, the bitter invective of which caused it to be speedily suppressed. Soon after his return to England, he became involved in a street brawl, and mortally stabbed a man with his penknife. He was tried for murder, made his own defense, and was acquitted, Dr. Johnson, Burke, and Garrick testifying to his good character. He died in London. His works include a *Dictionary of the English and Italian Languages* and an Italian Grammar, which have gone through many editions. His collected works were last published at Milan, in 1838. Consult Garizio, *Giuseppe Baretti e i suoi tempi* (Turin, 1872).

BARFLEUR, bär′flēr′ (projection on the channel, from Gael. *barr*, Scand. *bard*, projection, summit, + Teut. *fleot*, *fliez*, flush of water, canal, Ger. *Fliess*, Dutch *vliet*, AS. *fleót* = Engl. fleet, a river). A seaport and summer resort in the Department of Manche, France, 16 miles east of Cherbourg (Map: France, E 2). There is good sea-bathing and some trade in timber, cider, and fish. Up to the time of Henry IV., of England, it was strongly fortified, and a port of arrival from England. Population, in 1897, 1189.

BARFOD, bär′föt, Paul Frederik (1811-96). A Danish historian, born at Lyngby (Jutland). In 1848-49 he was a member of the Constitutional Assembly, subsequently also of the Folkething, and an official in the Ministry of the Interior. In 1866 he became an assistant in the Royal Library at Copenhagen. He was an advocate of Scandinavian unity. His principal work is *Fortællinger af Fædrelandets Historie*, "Tales from the History of the Fatherland" (4th ed., 1874).

BARFUSS, bär′fōōs, Hans Albrecht, Count (1635-1704). A Prussian field-marshal, born at Mögelin (Brandenburg). He first became prominent in 1678 as a colonel in the war against Sweden, and in the war against the Turks won much distinction as commander of the left wing at the storming of Buda in 1686. With an auxiliary force of 6000, he took a prominent part in the victory over the Turks at Salankamen (1691). Subsequently he was active in various cabals of the court, until expelled through the influence of his rival Von Wartenberg.

BAR′GAIN (OF. *bargaigner*, to chaffer, LL. *barcaniare*, to traffic, change about, from *barca*, bark, boat for traffic) **AND SALE.** A mode of conveying lands at common law, owing its efficacy to the Statute of Uses (q.v.). Technically the transaction was a bargain, or agreement, on the part of the vendor (hence called the *bargainor*), which amounted to a declaration of trust in favor of the purchaser (known as the *bargainee*), and which, being a 'dry' or passive trust, was thereupon executed by the force of the statute, transferring the title of the property from the former to the latter. It was essential to the efficacy of a bargain and sale that it should be based upon a valuable consideration, in order that it should operate to create a trust or to transfer the legal title to the lands affected thereby. The correlative transaction, where such a bargain or declaration of trust was made, without a material consideration, to a blood relation of the vendor, was known as a *covenant to stand seised* to the use of the latter. This was said to be based on the consideration of blood and affection, and was described as a 'good,' as distinguished from a 'valuable' consideration. It is to the prevalence of these forms of conveyance—which were by no means the only methods by which lands could be conveyed—that we owe the general but erroneous belief that a conveyance of lands not made to a relative of the grantor always requires a valuable consideration. The ancient conveyance by feoffment (q.v.) and the modern conveyance by grant (q.v.) have always been effective without an actual or pretended consideration. In order to avoid the registration of a deed of bargain and sale required by the Statute of Enrollments (27 Hen. VIII., c. 16, 1535), the modern deed of *Lease and Release* was invented, which was in effect a bargain and sale of the lands to be conveyed, for a year, followed by a release (q.v.), or quitclaim (q.v.), by the vendor of his reversionary estate as landlord. In this form the conveyance by bargain and sale was the usual mode of transferring the title to lands in England for three hundred years, and in the United States until the enactment of statutes, during the last century, substituting the more direct and convenient deeds of grant (q.v.), now generally in use. Deeds of bargain and sale and of lease and release, though infrequent and no longer necessary, may still be used. Consult: Blackstone, *Commentaries on the Laws of England;* Williams, *Principles of the Law of Real Property*, 17th International ed. (London, 1892; Boston, 1894).

BARGE′-BOARD (cf. LL. *bargus*, a sort of gallows). In wooden domestic architecture, in England, and later in Switzerland, when the roof projects considerably over the wall of a house, the gable is generally furnished along its edge with a board, which either covers a rafter or occupies the place of a rafter itself. These barge-boards were often very richly ornamented, particularly in the Fourteenth and Fifteenth centuries. They are sometimes termed *Verge-boards*.

BARGÈS, bär'zhĕs', Jean Joseph Léandre (1810—). A French Orientalist. He was born at Auriol (Bouches-du-Rhône) and was educated at Marseilles. He was ordained to the priesthood in 1834, and three years afterwards was appointed to the chair of Arabic at Marseilles. In 1842 he became professor of theology and of Oriental languages at Paris. Among his numerous publications are the following: *Temple de Baal à Marseille, ou Grande inscription phénicienne*, etc. (1847); *Aperçu historique sur l'Eglise épiscopale de Tlemcen* (1848); *Hébron et le tombeau du patriarche Abraham* (1865); *Vie du célèbre marabout Cidi Abou Medien* (1884); *Recherches archéologiques sur les colonies phéniciennes établies sur le littoral de la Celto-Ligurie*.

BAR'GHEST. A horrible goblin, with large teeth and claws, fabled to appear in the form of a huge dog or bear. Its appearance to any one portends immediate death or grievous misfortune. The barghest is still fancied to exist in the northern part of England. As to the origin of the name, opinions differ widely. The latter part, *ghest*, would seem to be identical with the German *Geist*, English *ghost*. Some think that 'barghest' is for *berg-geist*, 'mountain demon'; others refer it to *Bär*, 'bear,' in allusion to its supposed form.

BARGIEL, bär'gēl, Woldemar (1828-97). A German composer and teacher of music. He was born and died in Berlin. He studied music in Leipzig under Moscheles, Hauptmann, and Gade, and in 1850 began to teach in Berlin, where he made a reputation by publishing pianoforte and orchestral works. In 1859 he was made professor at the Conservatory of Cologne; in 1865 kapellmeister and director of music in Rotterdam, and in 1874 became professor in the Hochschule für Musik in Berlin. Bargiel was a devoted follower of Schumann (he was a stepbrother of Clara Schumann), and his works, though not numerous, are highly esteemed. He is best known by his overtures to *Medea* and *Prometheus*, and by his two choruses for female voices, *Spring Night* and the *XXIII. Psalm*. Consult J. A. Fuller-Maitland, *Masters of German Music* (London, 1894).

BAR'HAM, Richard Harris (1788-1845). An English humorist, known as 'Thomas Ingoldsby.' He was born in Canterbury, December 6, 1788, and died in London, June 17, 1845. He began to study law, left it for the Church, and was ordained in 1813. In 1821 he was appointed minor canon of Saint Paul's, London, and three years later became one of the priests in ordinary of His Majesty's Chapel Royal. In 1837 he began, in *Bentley's Miscellany*, the publication of the *Ingoldsby Legends*, a series of comic tales in irregular verse, by which he gained immediate fame as a humorist. Yet his life was grave and dignified, and he was held in high honor. Though a Tory in politics, he was the lifelong friend of Sydney Smith, the prominent Liberal; and Theodore Hook was also among his intimates. He published two novels, *Baldwin* and *My Cousin Nicholas*, and contributed largely to the *Edinburgh Review* and the *Literary Gazette*. "His sound judgment and kind heart made him the trusted counselor, the valued friend, and the frequent peacemaker; and he was intolerant of all that was mean, base, and false." For his biography, consult Barham, *The Life and Letters of the Rev. R. H. Barham* (London, 1880).

BAR HAR'BOR. See Mount Desert.

BAR'-HEBRÆ'US (1226-86). A distinguished and prolific Arabic and Syriac writer, whose full name was Gregorius Abulfaraj ibn Harun. He was born at Malatia in Armenia, and from the fact that his father Aaron was a Jew by birth, or, at all events, of Jewish descent, the son became known as Bar-Hebræus, that is, 'son of the Hebrew.' Bar-Hebræus himself, however, was a Christian and an adherent of the Jacobite sect. At an early age he entered upon the study of Arabic and Syriac, as well as of philosophy, theology, and medicine, and acquired such distinction that he was known among his contemporaries as 'the phœnix of the age.' At the age of 18 he went to Antioch and commenced a monastic life. Two years later he was made Bishop of Gubos (near Malatia) and the following year was transferred to Lakabhin, another diocese adjacent to Malatia. There he remained until 1253, when he was transferred to Aleppo, though he did not assume full charge until 1258. He died at Maragha in Azerbaijan on July 30, 1286.

Despite the absorbing duties incident to the charge of a large diocese, Bar-Hebræus manifested an astonishing literary activity, ranging over history, theology, philosophy, grammar, and medicine. Among his theological works, his critical and doctrinal commentary on the entire Bible, which he called the 'storehouse of secrets,' is the most important. Only portions of this compilation have been published. In the realm of philosophy, he compiled an encyclopædic survey of the whole Aristotelian discipline, which he subsequently rewrote in an abridged form. Best known is his great chronicle of universal history, written in Syriac. Beginning with Adam, it is brought down to his own days. The first part of it was published in Leipzig in 1789 by Bruns and Kirsch, and again by Bedjon (Paris, 1890), and the second and third parts by Abbeloos and Lamy (Louvain, 1872-77, 3 vols.). This work was rewritten by Bar-Hebræus in an abridged form in Arabic and published under the title of *History of Dynasties*, by Pococke, in a Latin translation, Oxford, 1663, and again at Beirut, 1890, by Salhani. His grammatical treatises, which are exceedingly valuable, were published by Abbé Martin in 1872 (*Œuvres grammaticales d'Aboul Faradj dit Bar Hebræus*, Paris, 1872, 2 vols.). Besides this, there are numerous medical treatises, mostly unpublished, as well as astronomical and cosmographical writings, and also a number of poems and tales.

BARI, bä'rē. An archiepiscopal city and flourishing seaport on the Adriatic, in Southern Italy (Map: Italy, L 6). It is the capital of the Province of Bari delle Puglie, and is on the Bologna-Brindisi Railway, 69 miles northwest of Brindisi. The old part of the town, which is on the tongue of land that divides the old harbor from the new, has narrow, crooked, gloomy streets. The new part of the town is on a rectangular plan, with broad avenues, squares, and gardens. The most interesting building is the Church and Priory of Saint Nicholas, founded in 1087, where Urban II., in 1098, assembled a council of Greek and Latin bishops to discuss the theological differences that divided the East and the West. It contains the splendid mausoleum of Bona Sforza, Queen of Poland and Duchess of Bari, who died here in 1557. In a vault under the silver altar in the crypt lie the bones of Saint Nicholas, from which is said to exude a fluid, *manna di San Nicola*, which heals miraculously. The Saint's festival, on the 8th of May, is attended by thousands of pilgrims. The cathedral, which dates from the first part of the Eleventh Century, was spoiled by repairs made in the Eighteenth. It contains paintings by Paolo Veronese, Tintoretto, and Calabrese. The castle, built in the Twelfth Century, is now used as a prison. Bari also has a seminary, a lyceum, the Ateneo, containing a technical school, and a provincial museum, a casino, a theatre constructed by Antonio Niccolini, and public gardens. The new harbor is accessible to the deepest ships, and the town enjoys a growing maritime trade. Some 1672 vessels, with a tonnage of 933,000, cleared in 1899, as against 1114, with a tonnage of 459,000, in 1890. There is regular steamboat communication with Venice, Ancona, Trieste, Brindisi, Genoa, and Marseilles. Bari manufactures organs, pianos, mirrors, furniture, candles, soap, and cordials, and has an extensive commerce in oil, wine, almonds, saffron, grain, fruit, cotton, and wool. The United States and other countries are represented by consular agents.

The importance of *Barium*, Gk. Βάριον, *Barion*, in the Third Century B.C. is shown by its coins. Horace wrote of the *Barii mœnia piscosi*. In the Middle Ages, Goths, Greeks, Franks, Saracens, Lombards, Venetians, and Normans fought for the possession of it. Population, in 1881, 61,500; in 1901, 77,478.

BARI. A negro tribe living on the White Nile, near Gondokoro. They practice agriculture to some extent, but their chief occupation is the raising of cattle. They are a warlike people, and offered a stout resistance both to the slave-traders and to the Egyptians, until they were subdued by Baker Pasha, in 1871. The Bari are very tall and finely formed. Both sexes shave the hair and paint the body red. Consult: Kaufmann, *Schilderungen aus Centralafrika* (Brixen, 1862); and for a grammar of their language, Mitterrutzrer (Brixen, 1867). See African Languages.

BARIE, bâr′ê (Gk. βαρύς, *barys*, heavy). The unit of pressure in the C. G. S. system (q.v.) adopted by the International Congress of Physicists at Paris in 1900, and corresponding to a pressure of 1 dyne to the square centimeter. The practical unit of pressure is the *megabarie*, or a pressure corresponding to a megadyne (10^6 dynes) to the square centimeter, and very nearly equivalent to the pressure of 75 centimeters of mercury. The megabarie is also a useful unit in that it corresponds approximately to the pressure of 76 centimeters of mercury under normal condition, or '1 atmosphere.' This pressure is equal to 1.0133 megabaries. See Mechanical Units.

BARILI, bȧ-rē′lḗ. A town of Cebu, Philippines, situated 52 miles from Cebu, the capital of the province. Population, in 1898, 20,914.

BARIL′LA (Sp. *barrilla*, impure soda). The crude sodium carbonate obtained from the ashes of marine plants, especially the *Salsola soda*, which was formerly raised for that purpose in Spain, Sicily, Sardinia, the Canary Islands, and the Levant. The seeds were usually sown at the close of the year, and in the September following the plants were ready for cutting. A month later the barilla was obtained in the following manner: Holes were dug in the earth, capable of holding one or two tons of the soda. Iron bars were laid across the cavities and the dried plants, mixed with reeds, were placed upon them and burned. The alkali contained in the plants passed into the cavities below as a red-hot fluid. By constantly adding the plants the burning was continued until the pits were filled, when they were covered with earth. When sufficiently cool the barilla was ready for shipment. The crude soda contained about 20 per cent. of alkali, together with sodium, calcium, and aluminum chlorides and sulphates, with a little sulphur. It was formerly much used for the manufacture of soap, but since the introduction of the improved process for manufacturing soda from salt, its production has declined. *British barilla* is the name sometimes given to kelp.

BARING, bā′rĭng, *or* bâr′ĭng. The firm of Baring Brothers was long one of the greatest commercial houses in the world. Its founder was John Baring, a German, who settled in a small business in Exeter, England, in the first half of the Eighteenth Century. Two of his sons, Francis and John, established in London, in 1770, a banking-house.

In November, 1890, owing to the continued failures of the Argentine Republic to pay the interest due upon its debt, which had been guaranteed by the Barings, the firm was threatened with suspension, but was saved by the action of the Bank of England, which, in conjunction with the firm of Brown, Shipley & Co., advanced the sum of £13,000,000 to tide over the crisis. The house of the Barings has since been reorganized as a limited company for carrying on a regular banking business, though on a less extensive scale than before.

Sir Francis Baring (1740-1810) became a director of the East India Company, and being a stanch supporter of Pitt, was created a baronet by that minister in 1793. He took an active part in the discussions relative to the Bank Restriction Act of 1797.

Sir Thomas Baring (1772-1848), eldest son of the above, succeeded his father in the baronetcy. He was a member of the Commons in 1830-32. He appears to have taken no active part in the business of the firm, and is known chiefly as an admirer and encourager of art. His magnificent collection of paintings was dispersed by public sale after his death.

Sir Francis Thornhill Baring (1796-1866), son of Sir Thomas, whom he succeeded, was educated at Oxford. He entered the Commons for Portsmouth in 1826, and under successive Whig governments was Lord of the Treasury, Secretary to the Treasury, Chancellor of the Exchequer, and First Lord of the Admiralty. He was created Baron Northbrook in 1866.

THOMAS BARING (1799-1873), brother of Thomas George Baring (q.v.), devoted himself early to commercial pursuits, and also to politics, siding with the Tories, contrary to the traditions of his family. He was, however, much more widely known as the principal manager of the firm of Baring Brothers than as a politician.

BARING, ALEXANDER, first BARON ASHBURTON (1774-1848). An English financier and statesman. He was born in London, October 27, 1774, the second son of Sir Francis Baring. For many years he was commercially engaged in the United States and Canada in the service of the great London mercantile house founded by his father. While in this country he married, August 23, 1798, Anne Louisa, eldest daughter of William Bingham, of Philadelphia, United States Senator; and to his alliance and to his American mercantile acquaintance he was much indebted in later life. On the death of his father in 1810, he became the head of the firm of Baring Brothers & Co., and in 1812 was elected member of Parliament for Taunton. In the first administration of Sir Robert Peel (1834-35), he was president of the Board of Trade and master of the Mint, and was created Baron Ashburton by patent in April, 1835. In 1842 Lord Ashburton's knowledge of business and thorough acquaintance with American institutions, customs, and modes of thought caused him to be appointed special ambassador to the United States to settle the Northwestern Boundary Question and other disputes, which then threatened to involve the two countries in war. In August of the same year he concluded the famous Treaty of Washington, commonly called the Ashburton Treaty, by which the frontier line between the State of Maine and Canada was definitely agreed to. By this treaty seven-twelfths of the disputed ground and the British settlement of Madawaska were given to the United States, and only five-twelfths of the ground to Britain; but it secured a better military frontier to Britain, and included heights commanding the Saint Lawrence which the award of the King of Holland, who had been chosen arbiter, had assigned to the Americans. By the eighth and ninth articles provision was made for putting an end to the African slave-trade, and the tenth article provided for the mutual extradition of suspected criminals. As an English statesman, Lord Ashburton opposed free trade, but strongly supported the penny-postage system when first proposed by Rowland Hill in 1837. His death took place May 13, 1848.

BARING, EVELYN, first VISCOUNT CROMER. See CROMER.

BARING, THOMAS GEORGE (1826—). First Earl of Northbrook. He has been Lord of the Admiralty, Under Secretary for War, member of Parliament, and from 1872 to 1876 Viceroy and Governor-General of India. From 1880 to 1885 he was First Lord of the Admiralty, and in 1884 Lord High Commissioner to Egypt. He published *The Teachings of Jesus Christ in His Own Words.*

BARING-GOULD, SABINE (1834—). An English author, born at Exeter. He studied at Clare College, Cambridge, and in 1864 was appointed curate of Horbury (Yorkshire). In 1871 he became rector of East Mersea (Essex), and in 1881 of Lew-Trenchard (North Devon). From 1871 to 1873 he was editor of *The Sacristy,* a quarterly review of ecclesiastical literature and art. The list of his published works is truly vast in number and most diversified in range. Valuable are his studies in the superstitions, legends, and folk-lore of the Middle Ages, such being *The Book of Werewolves* (1865), *Curious Myths of the Middle Ages* (2d series, 1866-67), and *Curiosities of Olden Times* (1869). His contributions to theology include *The Origin and Development of Religious Belief* (1869-70), *Lives of the Saints* (15 vols., 1872-77), and *The Lost and Hostile Gospels* (1874). He also published some incisive sermons; in 1875, *Village Sermons for a Year,* and in 1880, *The Preacher's Pocket.* In 1880 appeared his *Mahalah,* a powerful though somewhat uneven and melodramatic story, since followed by *John Herring* (1883-86), *Court Royal* (1886-88), and *The Broom Squire* (1896). His opera, *The Red Spider,* was produced in 1898.

BARINGO, bȧ-rĭṉ′gō̇. A lake in East Africa, situated in about latitude 0° 30′ N. (Map: Congo Free State, G 2). It lies at an altitude of nearly 4000 feet, and covers an area of about 190 square miles, and although it is without visible outlet its water is fresh. It contains a number of small islands, one of which is inhabited. It was discovered in 1883 by J. Thomson.

BA′RITE. See BARIUM.

BAR′ITONE. See BARYTONE.

BA′RIUM (Neo-Lat., from Gk. *βαρύς, barys,* heavy; alluding to its high specific gravity). A metallic element isolated in 1808 by Sir Humphry Davy. It is not found native, but occurs chiefly as the sulphate in barite, as the carbonate in witherite, and in other minerals of a more complex composition; also in mineral waters, the ashes of certain plants, and in sea-water. Metallic barium was first obtained by Davy, who decomposed its hydrate with a powerful voltaic battery, and obtained an amalgam of barium and mercury. The mercury of the amalgam was expelled by heating in an iron crucible. The metal itself (symbol, Ba; atomic weight, 137.43) was described by Davy as 'silver-white,' and by Bunsen as 'golden-yellow,' in color, so that it is questionable as to whether chemically pure barium has ever been obtained. It is a slightly lustrous, somewhat malleable metal, which melts at a red heat, but cannot be distilled. Its specific gravity is from 3.5 to 4.

The compounds of barium are used for a variety of purposes. Its peroxide, BaO_2, formed when the anhydrous monoxide is heated to a dull red heat in a stream of oxygen, is used in the manufacture of peroxide of hydrogen. Barium peroxide may, further, be used as a bleaching agent as well as for preparing oxygen.

The monoxide of barium, called *baryta,* is found, in combination with carbonic acid, as the mineral witherite, and in combination with sulphuric acid as the mineral barite, or heavy spar. It is prepared commercially by heating barium nitrate in a porcelain crucible or retort, or by igniting barium carbonate in the strong heat of a forge fire. It is a grayish white, extremely caustic, poisonous, and strongly alkaline mass, which finds its chief application in sugar-refining, as it forms an almost insoluble compound with sugar when added to molasses or other saccharine solutions. Baryta unites readily with water to form barium hydroxide.

Barium sulphate, the most important of the commercial salts of barium, is found native as the mineral barite or barytes (also called cawk, cauk or caulk). It is found in England, as in Derbyshire and Shropshire; also in Europe, and in the United States at various localities, but chiefly in Missouri, Tennessee, North Carolina, and Virginia. It is a heavy, white mineral, with a specific gravity of 4.48, and is found crystallizing in the orthorhombic system, and massive. The better grades are used in the manufacture of pigments, as a cheap substitute for, or as an adulterant of, white lead; in manufacturing reagents, and in pyrotechny; also as a makeweight in the paper manufactures; while the lower grades are used by pork-packers in the preparation of canvas for their products. Barium sulphate was an important constituent of the white body used by Wedgwood in his jasper-ware. It is made artificially by adding dilute sulphuric acid to a solution of barium chloride; the resulting white precipitate, after being well washed and dried, constituting the pigment called *blanc fixe*, or *permanent white*. In 1899, 41,894 short tons of barytes, valued at $139,528, were produced in the United States.

Barium chloride, made by treating the native carbonate, witherite, with hydrochloric acid, is used in chemistry as a reagent, in the preparation of the artificial sulphate or permanent white, and for preventing incrustation in boilers.

Barium nitrate is prepared commercially by dissolving the native carbonate in dilute nitric acid and crystallizing the barium nitrate. It is largely used in pyrotechny, in the preparation of green fires, and in the manufacture of explosive compounds, as a substitute for potassium nitrate.

Barium salts, when brought into a non-luminous flame, burn with a yellowish-green color.

BAR'JE'SUS. See ELYMAS.

BARK (akin to Sw. and Dan. *bark*, LG. *borke*; possibly related to AS. *beorgan*, Ger. *bergen*, to cover). In the stems of perennial woody plants, the portion which lies outside the wood, and can be easily separated from it, particularly at certain times. The term is also often applied to the corresponding part of annual stems, especially to those which contain textile fibres, such as flax, hemp, etc. But this is more properly called the cortex (q.v.), and the word 'bark' should be used only of shrubs and trees. European and English botanists, and consequently English translations of foreign works, use the term 'bark' for the dead and dry outer portions only of what is known in this country as bark.

The bark of a one-year-old twig consists of three concentric zones: (1) The inner is the phloem (q.v.), or bast, whose work is the conduction (q.v.) of foods; (2) the outer is the skin (epidermis) and the layers of cork beginning to develop near it; (3) between these lies the green zone, whose cells are still capable of making food. See PHOTOSYNTHESIS.

The green zone does not usually exhibit further growth; the others increase in thickness. The inner bark receives additions to its inner face season after season from a layer of actively dividing cells, known as the cambium (q.v.), which lies between it and the wood. The outer zone increases because a layer of similar cells, the phellogen (q.v.), develops from the epidermis (q.v.), or some of the cells of the cortex. This cork cambium, as it is otherwise known, gives rise by division of its cells, chiefly in a tangential plane, to layers of cork and other tissues. The corky layers, being almost impervious to water, cut off all tissues outside them from nutriment; these tissues consequently die and dry up. If the cork cambium continues its activity year after year, the tissues it produces become thicker and thicker. By drying and weathering, the outside becomes rough and irregularly seamed, the internal increase in diameter tending to make the longitudinal furrows and ridges the more conspicuous. In this case the green layer loses its color wholly, or retains it only beneath the deep furrows.

If the activity of the first cork cambium ceases and new phellogen layers are formed, deeper portions of the green zone are continually involved, and finally the whole of it comes to lie outside the newest cork; wherefore it perishes. The new phellogen layers may next invade the phloem, so that the bark may come to consist only of the phloem and the tissues produced by the cork cambium. The corky layers are lines of weakness. Warping, due to drying and wetting, cracks these layers, and the outermost sheets or flakes of bark are loosened and fall off. If the corky layers are very close together and concentric, a bark such as that of the paper birch or sycamore results; but in most barks the flakes are irregular.

TANNING. The bark of many trees is capable of being used for tanning, but that is preferred which particularly abounds in tannic acid. Oak bark is principally used in Great Britain and throughout Europe, as well as in North America, where hemlock, however, is more extensively employed. In Spain the inner layer of the bark of the cork oak, or cork tree, is employed. The bark of the chestnut is also much valued for this purpose. Larch and willow are used in preparing some kinds of leather. The bark of the birch and that of the alder are also employed, birch bark being, however, more esteemed for steeping fishermen's nets and cordage, to preserve them from rotting, than for the preparation of leather. Different species of Acacia (q.v.) and of Eucalyptus (q.v.) furnish barks used for tanning in Australia, some of which have, to a small extent, become articles of commerce.

The barking of trees can be accomplished with facility only in spring, when the sap has begun to circulate. The tree being felled, the rough, external lifeless parts of the bark are removed as useless; the smaller branches are cut into lengths of about two feet, and their bark is loosened by beating with a mallet, and easily taken off; the bark of the trunk and main branches is cut by a chisel-like instrument or with an axe into similar lengths, each of which is divided longitudinally, and finally stripped off by the aid of mallets, chisels, etc. The bark is sometimes dried in sheds, being placed on narrow shelves or frames in such a way that there may be a free circulation of air about it; sometimes in the open air, when it is very generally made to rest in a sloping position against trunks of trees placed horizontally at a little distance from the ground, the larger pieces of bark being placed so as to protect the smaller both from sun and rain. Great care is necessary in the drying of bark, as it is much damaged if allowed to get moldy, and is liable to suffer injury from rain or from the exposure of its inner surface to the sun.

Medicinal Barks. The principal barks used in medicine will be found noticed in separate articles. (See Andira [cabbage bark, Surinam bark]; Angostura Bark; Exostemma [Jamaica bark, Saint Lucia bark, Piton bark]; Cascarilla [cascarilla bark, Eleuthera bark]; Cinchona [cinchona bark, Peruvian bark, Jesuits' bark, Arica bark, Calisaya bark, Carabaya bark, Huamalies bark, Huanuco bark, Jaen bark, Loxa bark, Maracaibo bark, ash bark, crown bark, silver bark, yellow bark, tan bark, etc.]; Clove Bark; Copalche Bark; Culilawan Bark; Winter's Bark.) When bark is mentioned without any prefix it is always cinchona, otherwise called Peruvian or Jesuits' bark, which is intended. Other barks used medicinally include cinnamon, which is used chiefly for flavoring; granatum, the bark of the pomegranate, used to expel tapeworms (see Anthelmintic); and Prunus Virginiana, or wild cherry, an ingredient of many cough mixtures. Rhamnus Purshiana, or Cascara sagrada, is an important derivative of the bark of that plant. Ulmus, or slippery elm, is the inner bark of Ulmus fulva. It contains a large amount of mucilaginous material, and is used as a demulcent. Viburnum prunifolium, a valuable uterine sedative, is obtained from the bark of the plant. See Cinchona.

BARK, or **BARQUE** (LL. *barca, barica,* boat, probably dimin. of Gk. βᾶρις, *baris,* rowboat, Coptic *bari,* boat). A three-masted vessel, which is fore-and-aft rigged on the mizzen-mast, the main and fore being square-rigged. A vessel of any kind, especially a sailing vessel of small size. The distinction between a *bark* and a *barkentine* is that the latter has only the foremast square-rigged, the main and mizzen masts being fore-and-aft rigged.

BARKAL, bär'kăl, or **JE'BEL BARKAL.** An isolated mountain of sandstone in Nubia, near the Fourth Cataract of the Nile. It is situated about one mile from the river, is some two miles in circumference, and rises abruptly to the height of nearly 400 feet. The summit is flat, forming a broad plateau. In hieroglyphic inscriptions it is called 'the holy mountain.' Its appearance is most picturesque. Between Jebel Barkal and the river lay the ancient Ethiopian capital, Napata, destroyed by the Romans under C. Petronius, in B.C. 24. The site of the city is marked by the ruins of several large temples, among which that of the god Amon is the most conspicuous, and by groups of royal tombs, built in imitation of the Egyptian pyramids, though upon a much smaller scale. Excavations conducted at this place by the Egyptian Government, in 1862, yielded rich results in sculptures and hieroglyphic inscriptions of historic interest. The best representations of the monuments of Jebel Barkal are to be found in the fifth volume of Lepsius's *Denkmäler* (Berlin, 1842-45), and in Mariette's *Monuments divers* (Paris, 1872-89). For descriptions of the locality, consult: Cailliard, *Voyage à Meroë* (Paris, 1819); and Hoskins, *Travels in Ethiopia* (London, 1835).

BARK BEE'TLE, BARK CHA'FER, or **ENGRAV'ER BEETLE.** A minute cylindrical beetle, of the family Scolytidæ. These beetles live in or under bark and in wood. Most of the very numerous species burrow between the bark and the wood, and a few forms tunnel through the wood. (See Ambrosia Beetle.) The female starts each series of engravings and deposits her eggs there. The young, on hatching, dig a series of burrows at angles with the original burrow of the parent. These beetles and their young are very destructive to trees, either killing them outright or injuring the value of the wood by means of their burrows. Several destructive species live in the United States, and one is extremely injurious to the pine forests of Germany.

BARK'ENTINE. See Bark.

BARK'ER, Albert Smith (1843—). An American naval officer, born at Hanson, Mass. He graduated at the United States Naval Academy in 1861, and during the Civil War took part in the capture of New Orleans and the siege of Port Hudson. He was promoted to be commander in 1877, and in 1892 to be captain. During the Spanish-American War he was in command of the cruiser *Newark;* and afterwards, in command of the *Oregon,* succeeded Admiral Dewey as commanding officer of the Asiatic Squadron. In 1901 he became senior captain, commanding the squadron for special service, and in the same year was made commanding officer of the Brooklyn Navy Yard.

BARKER, Edmund Henry (1788-1839). An English philologist, born December 22, 1788, at Hollym, Yorkshire. He studied at Cambridge. Besides editions of Latin classics, and numerous contributions to periodicals, particularly to the *Classical Journal,* he was led, during a residence with the famous philologist Parr, to undertake a revision of Stephens's *Thesaurus Linguæ Græcæ* (12 vols., 1826). This gigantic work was violently assailed in the *Quarterly Review* by Blomfield, to whom Barker replied with his *Aristarchus Anti-Blomfieldianus* (London, 1818). In 1812 appeared the first volume of his *Classical Recreations.* He also supplied materials for the composition of Sturtz's *Etymologicum Gudianum.* He likewise translated some works of German philologists, among them Buttmann's *Greek Grammar for Schools.* He collected the mass of anecdote and criticism relative to his friend Dr. Parr, which was published in two volumes in 1828-29, under the title of *Parriana,* a work well-nigh unreadable, from the superabundance and ill-digested nature of its matter. He also assisted Professor Dunbar in the compilation of his Greek and English Lexicon, published in 1831. He lost all that he had in a lawsuit, so that he was obliged to sell his fine library, and was put into the debtors' prison. He died in London March 21, 1839, in extreme poverty.

BARKER, Fordyce (1818-91). An American physician. He was born at Walton, Me.; graduated at Bowdoin in 1837, and studied medicine at Harvard, Paris, and Edinburgh. He was then professor of midwifery at Bowdoin, and afterwards in the New York Medical College; was president of the New York State Medical Society, and professor of clinical midwifery and diseases of women in Bellevue Medical College. He wrote, in 1872, a treatise on *Puerperal Diseases,* and a number of papers on other subjects.

BARKER, George Frederick (1835—). An American scientist. He graduated at the Yale

Scientific School in 1858, and was chemical assistant in Harvard Medical School in 1858-59 and 1860-61. He was then, successively, professor of chemistry and geology in Wheaton (Ill.) College, acting professor of chemistry in Albany Medical College, professor of physiological chemistry and toxicology in Yale, and professor of physics in the University of Pennsylvania. He has been president of the American Association for the Advancement of Science, a member of the United States Electrical Commission, and for several years an associate editor of *The American Journal of Science*. He has lectured in many cities, and is author of a *Text-Book of Elementary Chemistry* (1870).

BARKER, JACOB (1779-1871). An American financier and lawyer, born in Swan Island, Me., of Quaker parentage. He went to New York at the age of 16, engaged in trade on his own account, and soon amassed a considerable fortune. Early in the War of 1812 he was instrumental in securing a loan of $5,000,000 for the National Government, which was then pressed for funds. He took an active interest in politics, was a prominent member of the Tammany Society, and served for a term as State Senator. He was for some time a member of the Court of Errors, as then constituted, and in one instance had his opinion on an important point sustained against that of Chancellor Kent. In 1815 he founded the Exchange Bank of New York, and subsequently became interested in many other large financial institutions in the city, including the Life and Fire Insurance Company, on the failure of which, in 1826, he, with a number of others, was arrested on a charge of conspiracy to defraud. Barker at first conducted his own defense, but subsequently was represented by such eminent counsel as Benjamin F. Butler and Thomas A. Emmet. The jury disagreed on the first trial, and convicted Barker on the second; but an appeal was granted, and the indictment was finally quashed. Barker removed to New Orleans in 1834, and soon became prominent there in financial circles, besides being admitted to the bar, and practicing with some success in insurance cases. At the close of the Civil War he was elected to the United States Senate, but Louisiana not having been readmitted to the Union, he was not allowed to take his seat. In 1867 his business ventures having proved unfortunate, he was declared bankrupt, and spent the last few years of his life with his son in Philadelphia. He published *The Rebellion: Its Consequences, and the Congressional Committee, Denominated the Reconstruction Committee, with Their Action* (1866). Consult: *Incidents of the Life of Jacob Barker from the Year 1800 to the Year 1855* (New York, 1855); Turner, *The Conspiracy Trials of 1826 and 1827: A Chapter in the Life of Jacob Barker* (Philadelphia, 1864); *The Speeches of Jacob Barker and His Counsel on the Trials for Conspiracy* (New York, 1826); and *The Trial of Jacob Barker, Thomas Vermilya, and Matthew L. Davis* (New York, 1827).

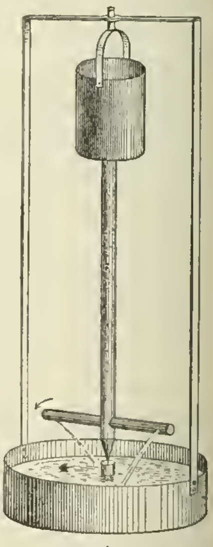
BARKER, LEWELLYS FRANKLIN (1867—). A Canadian-American anatomist, born at Norwich, Ont. He studied at Pickering College and the University of Toronto, and in 1894-1900 was at the Johns Hopkins University, successively as associate in anatomy, assistant resident pathologist, associate professor of anatomy, and associate professor of pathology. In 1900 he became a professor and head of the department of anatomy in the Rush Medical College of the University of Chicago. He has published *The Nervous System and Its Constituent Neurones* (1899).

BARKER, MATTHEW HENRY (1790-1846). An English writer of sea-tales, born at Deptford. He shipped on an East Indiaman, afterwards served in the Royal Navy, and from 1827 to 1838 edited a newspaper at Nottingham. Under the pseudonym "The Old Sailor," he wrote a number of sea-tales, exceedingly popular at that time. The list of his works includes *Land and Sea Tales* (2 vols., 1836), *Topsail-Sheet Blocks* (3 vols., 1838), *The Naval Club* (3 vols., 1843), and *The Victory* (3 vols., 1844).

BARKER, THOMAS JONES (1815-82). An English historical painter, born at Bath. He studied in Paris under Horace Vernet, in 1835-45 exhibited much at the Salon, and subsequently at the Royal Academy. In 1870-71 he was an observer of the Franco-Prussian War. His works include "The Meeting of Wellington and Blücher" (1851), "Wellington Crossing the Pyrenees," "The Mêlée—Charge of Cuirassiers and Chasseurs" (1872), "Balaklava—One of the Six Hundred" (1874), and "The Return through the Valley of Death" (1876).

BARK'ERS. See JUMPERS.

BARKER'S MILL (Fr. *roue-à-réaction*, Ger. *Segners Wasserad*). A water-wheel invented by Dr. Barker toward the end of the Seventeenth Century. It is represented in its simplest or typical form in the cut. There is a metal pipe, terminating at its lower end in a steel spindle, which rests on a metal block, and is kept in a vertical position by another spindle, at its upper end, which passes through the frame of the machine, so that the pipe can easily revolve around its axis. Near its lower end, two smaller pipes or arms are inserted, which project horizontally from it, and these have each, at the outer extremity, a hole or fine nozzle opening toward opposite sides. The water is supplied from a reservoir which opens into the upper part of the vertical tube, whence it issues from the lower orifices. The reaction caused by the water gushing from the arms forces them backward, and gives to the whole machine a rotatory motion. This reaction is much the same as is seen in the recoil of a gun when fired, or in the pushing back of a small boat by the foot on stepping ashore.


BARKER'S MILL.

BARK'ING (AS. *Beorcingas*, descendants of Beorc). A town of Essex, England, a northeastern suburb of London, on the left bank of the Roding, 2 miles above its confluence with the Thames (Map: England, G 5). It has jute factories and other industries, and vegetable gardening is extensively carried on for the metropolitan markets. The municipality is distinguished by its progressiveness, owns electric and gas lighting plants, water-works, and wharf; has provided artisans' dwellings, cottage allotments, recreation grounds, public baths, and free library, and maintains isolation hospitals and a cemetery. Its most notable edifice is the ancient and beautiful Church of Saint Margaret, and there are scanty remains of Barking Abbey, formerly one of the richest nunneries in England. It was founded in 670, by Saint Erkenwald, Bishop of London, whose sister, Saint Ethelburga, was the first abbess. It was burned by the Danes in 870, rebuilt by King Edgar in the Tenth Century, and dismantled by Henry VIII. Population, in 1891, 14,300; in 1901, 21,500. Consult *Barking Town, Its Progress and Public Works* (London, 1897).

BARK'ING BIRD. See GUIDGUID.

BAR'KIS. A country carrier in Dickens's novel, *David Copperfield*. He marries David's nurse, Peggotty, to whom he proposes by sending her the message, "Barkis is willin'."

BARK LICE. See COCCIDÆ and SCALE INSECTS.

BARKS'DALE, WILLIAM (1821-63). A Confederate officer in the Civil War in the United States. He was born in Tennessee, was educated at Nashville University, studied law, and served in the Mexican War. In 1853-61 he represented Mississippi in Congress as a pro-slavery Democrat, and upon the outbreak of the Civil War resigned his seat to take command of the Thirteenth Mississippi Volunteers. He was promoted to be brigadier-general, and fell at Gettysburg.

BARK STOVE. See HOTHOUSE.

BARLAAM, bär'lȧ-äm (—c.1348). A learned Italian monk. He was born at Seminaria, Calabria, and entered the Order of Saint Basil. He afterwards studied at Thessalonica, joined the Greek Church at Constantinople, and wrote his polemical *Liber contra Primatum Papæ*. He was sent by Andronicus III., in 1339, on a diplomatic mission to Pope Benedict XII., to obtain the assistance of Western Christendom against the Turks. Failing in this, he returned to Greece, and attacked the Hesychasts, or Quietists, of Mount Athos. At a synod held in 1341, the Hesychasts were so skillfully defended that he hastened to Italy, reëntered the Roman Church, and was appointed Bishop of Gerace. His principal work is *Ethica secundum Stoicos*. Barlaam was a man of great learning, distinguished as philosopher, mathematician, and astronomer. Among his pupils was Petrarch.

BARLAAM AND JOS'APHAT. One of the most widely spread religious romances of the Middle Ages. It is a Christianized version of the legendary history of Buddha, agreeing with it in many details. The story is briefly as follows: Josaphat was the only son of a heathen king in India, named Avenier. In order to prevent the fulfillment of a prediction that he would be converted to Christianity, Josaphat was brought up in close confinement under the care of heathen teachers, and surrounded by every luxury. Being visited, however, by a Christian hermit, Barlaam, he learned of the strange faith and was baptized. So great was his piety that he converted many of his companions, and finally even his father. On the latter's death he succeeded to the kingdom, but soon after abdicated and went into the wilderness. There he met Barlaam and lived a holy life. The celebrated divine, John Damascene, was formerly regarded as the author of the original Greek MS., which was first published by M. de Boissonade in the fourth volume of his *Anecdota* (Paris, 1832), and translated into German by Liebrecht (Münster, 1847). But even in the Middle Ages, a Latin version of this romance had been extensively circulated. About the end of the Fifteenth Century, it was often printed in a detached form, and later it appeared among the works of John Damascene (Paris, 1609). This theory of its authorship is no longer accepted. Vincent de Beauvais wove the story into his *Speculum Historiale*. In a condensed form the story appears in the *Golden Legend* of Jacobus de Veragme. From the Latin version sprang three French poetical versions belonging to the Thirteenth Century, and as yet unprinted. The Italian *Storia di S. Barlaam* (latest edition, Rome, 1816) may be traced to a Provençal original as early as the beginning of the Fourteenth Century. In Germany, Rudolf von Ems derived his poem, *Barlaam und Josaphat*, first printed at Königsberg (1818), and later at Leipzig, from the Latin. There is also an Augsburg impression of a prose translation of the ancient Latin text, belonging to the close of the Fifteenth Century. *Barlaam and Josaphat* appears in Middle English, in both a prose and a poetical version, the former edited by C. Horstmann. The Spanish *Historia de Barlaam y Josaphat*, by Juan de Arze Solorzano (Madrid, 1608), the Polish poetical version, by Kulizowsky (Cracow, 1688), and also the Bohemian (Prague, 1593), are all borrowed from the Latin; while the Icelandic *Barlaams Saga*, and the Swedish popular tale, *Barlaam och Josaphat*, both from the Fifteenth Century, have a German source. A Norwegian version, printed from an old vellum MS. of the beginning of the Thirteenth Century, said to have been translated by King Hakon Sverreson, appeared in 1851. This romance has even been rendered into the Tagalog language of the Philippines, and there printed (Manila, 1712). Consult: Liebrecht, *Zur Volkskunde* (Heilbronn, 1879); Max Müller, *Selected Essays* (London, 1881); and H. Zotenberg, *Notice sur le livre de Barlaam et Joasaph* (Paris, 1886).

BARLÆUS, bär-lē'ŭs, KASPAR, *properly* VAN BAERLE OR BAARLE (1584-1648). A Dutch poet and historian, born at Antwerp. He studied theology at Leyden, was appointed professor of logic there in 1617, and in 1619 was deposed as a partisan of the Remonstrants. In 1631 he was called to the chair of philosophy and eloquence in the Athenæum of Amsterdam. He published *Poemata* (1645-46), and *Rerum per Octennium in Brasilia et Alibi Nuper Gestarum Historia* (1647).

BAR-LE-DUC, bär'-le-dṳk', or **BAR-SUR-ORNAIN,** -sṳr' ôr'năN' (Fr., the duke's citadel, from Gael. *barr*, summit, projection, fort). The capital of the Department of Meuse, France, on the Ornain and the Canal de la Marne, 158 miles by rail east of Paris (Map: France, M 3). It is divided into three parts by the river and canal. Its chief buildings are the fine Fourteenth Century Church of Saint Etienne or Saint Pierre, a museum, lyceum, hospital, library, and a theatre. The manufacturing establishments include cotton and woolen mills, piano-factories, paper-mills, foundries, and confectioneries. Bar-le-Duc dates from the Sixth Century, and was formerly the residence of the Dukes of Bar. Population, in 1896, 18,249.

BARLETTA, bär-lĕt′tȧ (anciently, *Bardoli*, later *Barolum*). An island port, connected with the mainland by a bridge, on the Adriatic, in Southern Italy (Map: Italy, L 6). It is on the Bologna-Brindisi Railway, 35 miles northwest of Bari, with which it is also connected by a street railway. It is surrounded by ancient turreted walls, and has spacious squares and broad streets. The houses are high, with flat terraced roofs, and built mostly of sandstone. There are many beautiful Byzantine churches, among them the Cathedral of Sante Maria Maggiore, in which Ferdinand of Aragon was crowned. Interesting palaces are that of unhappy King Manfred, now turned into a convent, and the great castle constructed under Charles V. On the large square, facing the harbor, stands the celebrated bronze statue, 15 feet high, found in the sea and evidently of Roman workmanship, said to be a likeness of Heraclius, or Constantine, or Theodosius. In another square is a monument to the statesman Massimo d'Azeglio, who died in 1866. The inner harbor is accessible to small vessels only; but there is good anchorage for larger vessels in the roadstead which is protected by a mole, running out into the sea, on which stands a lighthouse. Barletta has regular steamboat communication with the other Adriatic ports, and exports grain, wine, oil, almonds, licorice, wool, and large quantities of salt. In 1503, during the war between Louis XII. and Ferdinand the Catholic, when Barletta was besieged by the French, there took place outside the wall, according to all the rules of chivalry, the famous combat between 13 French knights and 13 Italian knights, led by Bayard, *sans peur et sans reproche*, and Prospero Colonna respectively. Nine miles west of Barletta, on the Ofanto, is Canne, the ancient Cannæ, where in B.C. 216 Hannibal inflicted a disastrous defeat on the Romans. Population, in 1881, 33,179; in 1901 (commune), 42,022.

BAR′LEY (AS. *bærlic*, from *bere*, Engl. *bear*, barley + *leác*, a leek, plant). *Hordeum vulgare*. One of the most ancient of cultivated plants, of the natural order Gramineæ, or grasses. Its cultivation is mentioned in the Bible. It was grown by the ancient Egyptians, the Greeks, and the Romans, and according to the Waiki, one of the sacred books of the Chinese, it was cultivated in China twenty centuries before the Christian Era. It has been found in the earliest Egyptian monuments and in the remains of the lake-dwellings of Switzerland. Barley is found growing wild in western temperate Asia, and this region is considered as its original home. The range of latitude in which barley is cultivated is quite large, and practically equals the width of the temperate zones. It is grown as far north as Alaska, Iceland, and Norway, even reaching latitude 70° N., and it is also grown in Algeria, Egypt, India, and other countries with an almost equatorial climate. In Switzerland and Chile it ripens at an elevation of 5000 feet above the level of the sea, but it rarely ripens on the plateaus of Peru, which have an elevation of 9000 feet.

The preparation of the soil for barley does not differ materially from that for wheat. The land should be plowed fairly deep and thoroughly pulverized to form a well-prepared seed-bed. The soil should be porous, well drained, and of good fertility. Barley grows best on sandy and calcareous loams in northern latitudes, but in southern countries soils containing a little more clay give the best results. The plant has a comparatively short growing period, and the tilth and fertility of the soil should be such as to enable it to make a rapid growth. An excess of nitrogenous manures in the soil is injurious. When barnyard manure is applied directly to the crop it should be well rotted. The best method, however, is to apply it to a previous crop, preferably corn. For illustration, see colored plate Cereals.

In the United States and Canada, as well as in the greater portion of Europe, barley is sown in spring, and in the countries along the Mediterranean Sea it is sown in the fall. It is, however, also grown to some extent as a winter annual in the Southern States. The quantity of seed sown per acre varies from 2 to 3 bushels. Barley germinates at about the same temperature as wheat, but the young plant is more susceptible to cold than wheat; and a light frost, shortly after it is up, is often injurious. In the regions of the United States where spring wheat is grown, it is a common custom to sow it after wheat and before oats are sown. It is generally sown broadcast, but many farmers, especially in England, prefer to sow it in drills from 8 to 10 inches apart. The crop is now generally harvested with the self-binder. As soon as the sheaves are dry enough, they are stacked or hauled into barns to prevent exposure to rains or damp weather, which would injure the color of the grain and materially reduce its value. Barley ripens earlier than spring wheat, and is harvested usually just before that crop. When grown for malting purposes, it should not be harvested before it is thoroughly ripe.

The different varieties of barley, considered by many botanists as all belonging to one species, comprise four distinct types, namely, Two-rowed Barley, *Hordeum distichon;* Four-rowed Barley, *Hordeum vulgare;* Six-rowed Barley, *Hordeum hexastichon;* and Naked Barley, *Hordeum distichon nudum*. These different types have been considered as distinct species. The varieties of barley grown in the United States are generally of the six-rowed type, while in Europe the two-rowed type predominates. The finest varieties of malting barley, including Chevalier barley and the various selections made from it, which are the most popular for malting purposes, belong to the two-rowed type. The four-rowed varieties, frequently called bere or bigg in England, were formerly extensively used for malt, but are now being more and more replaced by the two-rowed varieties. The characters which determine a good malting barley are composition, capacity, and energy of germination, plumpness and weight of grains, mealiness, proportion of husk (glumes adhering to grain), color, smell, and absence of mutilated kernels. In malting, barleys of a high starch content and a low protein content are sought. Quick and even germination produces the best malt, hence the brewer's interest in the state of ripeness and the absence of injured grains, conditions which directly affect germination. Plumpness and weight of the grains and the proportion of husk give indications as to a high or a low percentage of starch. Mealiness is important, as it insures a much more ready transformation of the starch into soluble compounds than when the grains are hard and flinty. A musty smell and a stained or discolored appearance of the grain are evidences of injury, and materially reduce the value of barley from the brewer's point of view. The best malting barleys of the world are produced in eastern and southeastern England. The well-known chevalier variety was originated in Suffolk in 1819.

From 35 to 40 bushels of barley per acre is considered a good yield, although much larger returns are sometimes obtained. Under very favorable weather and soil conditions, the yield often reaches 60 bushels per acre or even more.

In the United States the production of barley has largely increased during the last 50 years. The total yield of barley in 1899 was 73,381,563 bushels, as against 5,167,015 in 1850, and 87,072,744 bushels in 1895, the largest total crop thus far produced. Of the amount in 1899, more than one-fourth (22,239,776 bushels) was produced in the State of California, the following States coming next in order: Iowa, 12,011,896 bushels; Minnesota, 8,144,125 bushels: and Wisconsin, 7,670,550. The average annual yield throughout the United States for the ten years 1890-1899 was 23.32 bushels per acre, and the average price per bushel 43⅔ cents.

Barley is affected in much the same manner as wheat by attacks of smut and rust. It is, however, much less liable to disease than any other cereal crop. See Rusts; Wheat.

Food and Feeding Value.—Barley grain, hay, and straw, as well as numerous milling and by-products from the grain, are used as feeding-stuffs. The grain, like other cereals, contains a fairly high percentage of proteids (12.4 per cent.) and a large amount of nitrogen-free extract (69.8 per cent.), chiefly starch. The other constituents are: Water (10.9 per cent.), fat (1.8 per cent.), crude fibre (2.7 per cent.), and mineral matter (2.4 per cent.). Barley is a common feeding-stuff in the Old World, having been satisfactorily used for the grain ration of horses, cattle, and pigs. It is not often fed in the United States, its use being confined largely to the Pacific Slope, where it is fed especially to horses. Comparative tests at the American Experiment Station have shown that, either alone or mixed with corn or other grain, it gives fairly satisfactory results with cattle, pigs, and sheep. In experiment with pigs, 80.1 per cent. of the dry matter, 81.4 per cent. of the protein, and 86.6 per cent. of the nitrogen extract of barley was found to be digestible. Barley is grown quite extensively for hay in some sections of the United States, being cut for that purpose before the grain is mature. The principal by-products are barley bran, barley feed (from pearled barley), screenings, malt sprouts, and brewer's grain (q.v.). The mill products are meal and pearled barley. As a food barley is used chiefly in the form of 'pearled barley,' i.e., barley with the husks removed, ground to a round form and polished. Barley is used for thickening soups, for making cooling drinks for invalids, and for a number of other purposes. The ground grain does not make a satisfactory bread; for, although it contains a fairly large amount of proteid matter, it is deficient in gluten. Combined with cow's milk, barley is frequently used for feeding infants, its carbohydrates and mineral matter rendering it very wholesome.

BARLEY-BREAK. A popular amusement, very common in the reign of James I., and with certain modifications in name and practice still existing among young persons in both England and Scotland. Originally, it was played by six people, three of each sex, who were formed into couples. A piece of ground was then apportioned into three parts; and into the centre one, called *hell*, a couple was doomed by lot. The sport consisted in the two in the condemned part 'catching' one of the other couples while they were in the act of changing places, when the couple caught had to go into the centre. It was, however, no easy matter for the two in the centre to capture another couple; for, by the rules of the game, they were bound to keep united, while the others, when hard pressed, might sever.

BARLEYCORN, John. A personification of the spirit of barley or malt liquor, used jocularly, and also in humorous poetical effusions, as by Robert Burns. There exists a whimsical English tract of old date, under the title of *The Arraigning and Indicting of Sir John Barleycorn, Knt., printed for Timothy Tosspot,* in which Sir John is described as of "noble blood, well beloved in England, a great support of the Crown, and a maintainer of both rich and poor."

BARLEY RUST. See Rusts.

BAR'LOW, Francis Channing (1834-96). An American soldier and lawyer, born in Brooklyn, N. Y. He graduated at Harvard in 1855, and was admitted to the New York Bar. In 1861 he enlisted in the Twelfth New York National Guard, and after a three months' term became lieutenant-colonel of the Sixty-first New York Volunteers. He participated in the battles of Antietam, Chancellorsville, and Gettysburg, and was mustered out with the rank of brigadier-general and brevet major-general. From 1865 to 1868 he was Secretary of State for New York, and in 1872-73 was Attorney-General for the State. In the latter capacity he directed the prosecution of W. M. Tweed and his associates. He subsequently practiced law. He was a founder of the Association of the Bar of New York City.

BARLOW, Jane (1860—). An Irish novelist, daughter of Rev. J. W. Barlow, Vice-Provost of Trinity College, Dublin. She was born at Clontarf, near Dublin, October 17, 1860. She has described, with rare sympathy and humor, Irish village life, employing sometimes verse, but usually prose. *Bog-land Studies*, verse (1892), has been followed by *Irish Idylls* (1892); *Kerrigan's Quality* (1893); *The End of Elfintown* (1894); *The Battle of the Frogs and Mice* (1894); *Maureen's Fairing* (1895); *Strangers at Lisconnel* (1895); *Mrs. Martin's Company* (1896); *Creel of Irish Stories* (1897); *From the East unto the West* (1898); *From the Land of the Shamrock* (1900); and *Ghostbereft and other Stories* (1902).

BARLOW, Joel (1754-1812). An American poet and man of affairs. He was born at Redding, Conn., March 24, 1754, and was educated first at Dartmouth, then at Yale, developing early great poetical aspirations. In 1780, two years after graduating, he entered the army as chaplain, and after the peace studied law at Hartford, where, in 1786, he was admitted to practice. In the previous year he had edited a *Book of Psalmody* for the Congregational churches of Connecticut, which was used until his religious opinions became heterodox. He also took part in political and literary journalism, and wrote verses with the other "Hartford Wits." In 1787 his rather pompous poem, *The Vision of Columbus*, greatly admired at the time, made him very well known. It brought him also the European agency of the Scioto Land Company, which had acquired redemption rights in 3,500,000 acres of land in Ohio, and sought to market them abroad. On this fraudulent mission Barlow innocently went in 1788 to France, beginning a long exile, in which his religious and political opinions were much liberalized. He also passed some time in London, associating with the advanced liberals; and here, as well as in France, he published political works, the most noteworthy of which is *Advice to the Privileged Orders*, proscribed by the British Government. Late in 1792 Barlow returned to France, and was active in politics till his defeat as candidate for the Convention in 1793. At this period he obtained the hint for *Hasty Pudding*, his most popular poem, a mock-heroic that is still readable. He now embarked in commerce and made a considerable fortune. In 1795, with great self-sacrifice, he became consul at Algiers and rendered valuable services to American prisoners. Returning to Paris, he led a literary life, preparing historical works on the American and French Revolutions, which were never completed, and expanding his *Vision of Columbus* into an epic, *The Columbiad*, which, when published in 1807, in a magnificent quarto, fell absolutely flat. In 1805, having never lost his patriotism, which he had shown during the X. Y. Z. Affair, he returned to America, where he was cordially received by the Republicans, but vituperated by the Federalists. Until 1811 he resided at Kalorama, near Washington, cultivating literature and farming. He was then appointed commissioner to Napoleon, and accepted the office only from a sense of duty. Going to meet Napoleon at Vilna, he became involved in the disastrous retreat of the French Army from Russia, and died of exposure at a small Polish village, December 24, 1812. Barlow's merits as a poet were small, but he was a fair prose writer, a cultivated and enterprising man of affairs, and a true patriot. Consult Todd, *Life and Letters of Joel Barlow* (New York, 1886).

BARLOW, WILLIAM HENRY (1812-1901). An English engineer. He was born and educated at Woolwich. In 1832 he went to Constantinople, where he planned the factory and machinery for the improvement of the Sultan's ordnance, and examined the lighthouses at the entrance to the Bosporus. For this service he received from the Sultan the decoration of the 'Nichan.' He was the engineer of the new bridge over the Tay (1880-87), and coöperated with Sir J. Fowler and J. Harrison in designing the Firth of Forth Bridge. He was president of the Institution of Civil Engineers in 1880. Among his publications may be mentioned: *Illumination of Lighthouses* (1837); *Diurnal Electric Tides and Storms* (1848); *Resistance of Flexure in Beams* (*Proceedings* of the Royal Society, 1855); *The Logograph* (1874).

BAR'LOWE, ARTHUR (c.1550-c.1620). An English navigator. In 1584 he and Philip Amadas (q.v.) were sent out by Sir Walter Raleigh to find a favorite location for a colony in America. Leaving England April 27, they reached the Canaries May 10, and one of the West Indian Islands June 10, and "on the 2d of July," says Barlowe, "we found shole water, wher we smelt so sweet and so strong a smel as if we had been in the midst of some delicate garden abounding with all kinds of odoriferous flowers." This indicated the proximity of land, and two days later they sighted a part of the North Carolina coast. They spent some time exploring the coast in the vicinity of the present Pamlico and Albemarle sounds (touching upon Roanoke Island), and arrived in England on their return voyage in the middle of September, bringing glowing accounts of the beauty and attractiveness of the new country. Barlowe wrote a detailed narrative of the voyage in a letter to Raleigh, which may be found in Vol. III. of Hakluyt, *Principall Voyages, Traffiques, and Discoveries of the English Nation* (London, 1599-1600), and has been reprinted, in part, in Vol. I. of A. B. Hart, *American History Told by Contemporaries* (4 vols., New York, 1897-1901).

BARM. See YEAST.

BAR'MECIDES, or **BAR'MEKIDES.** A Persian family, celebrated in history as the ministers of the early Abbasside caliphs. Khaled-bin-Barmek was the Chancellor of the Exchequer under Abu'l Abbâs as-Saffâh, the first Abbasside Caliph; and his influence endured through the reigns of Al-Mansur and Al-Mahdi. Yahya, the son of Khaled, was intrusted by Al-Mahdi with the education of his son, the celebrated Harun-al-Rashid, and was made vizier by Harun upon his accession to the caliphate (A.D. 786). By his military skill and wise civil administration he contributed largely to the prosperity of the reign, the Caliph himself bestowing on him the appellation of 'Father.' Yahya's sons, Fazl and Ja'far (the Giafar of the *Arabian Nights*), were greatly beloved by the Caliph, who appointed Ja'far vizier to succeed his father. But the splendor of the family and the unlimited power it enjoyed gained it many enemies, who persuaded Harun that the Barmecides were aiming at the crown. The Caliph caused Ja'far to be executed, and the others to be thrown into prison. He carried his enmity so far as to forbid the mention of their name on pain of death; but their virtues and their glory are celebrated by the Mohammedan poets and historians, whose munificent patrons they were. Consult: Muir, *The Caliphate* (London, 1891); Weil, *Geschichte der islamitischen Völker* (Stuttgart, 1866).

BARMECIDE'S FEAST. A phrase which originated in a story related in the *Arabian Nights* (Story of the Barber's Sixth Brother). A poor man who had not had food for two days visited one of the rich Barmecides and asked for food. He was invited to dinner. One after another, empty dishes were brought in, and the host asked the man how he liked the food. All was taken good-naturedly until the wine was brought, when the guest, pretending to be drunk, boxed the host on the ear. This bit of humor thoroughly delighted the Barmecide, and he ordered that a real feast be placed before the man.

BAR'MEN. A city in the Province of Rhenish Prussia, on the Wupper, about 25 miles northeast of Cologne (Map: Prussia, B 3). It is divided into Upper, Middle, and Lower Barmen, and includes several small villages, now united into one district. Its western boundary adjoins the city of Elberfeld. The city has clean and well-kept streets, the principal avenue being the Alleestrasse. The river, which flows through the length of the city, is crossed by about 20 bridges. Among the noteworthy buildings are the old and the new Rathaus and the Municipal Theatre. Barmen has only one park, which is, however, well wooded, having been made up of a number of woodlands purchased by the city. The city owns its water-works, its gas-works, and electric-light plants, all of which net large profits to the city, helping to keep down taxes, while furnishing the people high-grade service at reasonable rates. Barmen has numerous benevolent and charitable institutions, including a municipal hospital. Its educational institutions consist of a gymnasium, several high schools, an industrial school, a natural-history museum, a library, and a picture gallery. The district adjoining the city is one of the most populous and prosperous in Germany. Barmen is the principal seat of the ribbon manufacture on the Continent. Its fabrics go to all parts of the world. It produces linen, woolen, cotton, silk and half-silk ribbons, cloth of various kinds, stay-laces, thread, etc. It has also considerable manufactures of soap, candles, metal-ware, buttons, machinery, organs, and pianofortes. There are, besides, in the valley, numerous bleachfields and Turkey-red dye-works. Barmen has six railway stations, and is in railway communication with all the principal German cities. For local traffic Barmen has several electric railways, including a novel electric swinging railway built over and following the bed of the Wupper between Barmen and Sonnborn. Lower Barmen has a mineral spring and a bathing establishment. Population, in 1890, 116,000; in 1900, 142,000. Barmen is first heard of in the Eleventh Century. In the Fifteenth Century the bleaching industry was highly developed there. Its modern prosperity dates from its annexation to Prussia in 1815.

BAR'MOTE COURT (for earlier *bargemote*, *berghmote*, from *berg*, hill + *mote*, meeting). The name of local courts held in the lead-mining districts of Derbyshire, England, for the determination of the ancient rights and privileges of the inhabitants of those districts, in the lead-mines, and for the settlement of disputes relating thereto. These courts are of great antiquity, but their jurisdiction and procedure are to a considerable extent regulated by statutes of the late Queen Victoria's reign (14 and 15 Vict. c. 94). Consult: *Encyclopædia of the Laws of England*, II. 18; Bainbridge, *The Law of Mines and Minerals* (5th ed., London, 1900).

BAR'MOUTH. A picturesque watering-place in Merioneth County, Wales, situated at the mouth of the Maw, 230 miles from London. On the opposite shore lies Cader Idris, over 2900 feet high. Population, in 1901, 2245.

BARN (AS. *berern*, *bern*, from *bere*, barley + *ern*, a close place). A building used for the storage of feed, farm products, implements, and machinery, and for the housing of stock, all under one roof. It is now generally recognized that it is more convenient and economical of labor to make ample provision for these purposes in one compact building, than to have a number of separate buildings—stables for horses, cow-houses, sheepfolds, piggeries, etc. Similar considerations of convenience and economy of labor make it desirable to have the barn centrally located, in communication with as many fields as possible, and at a convenient distance from the farmhouse, though not so near as to be offensive or dangerous in case of fire. The situation selected should be well drained, either naturally or by artificial means, so that the stalls, yards, and courts may be kept clean and dry. A hillside facing the south furnishes an especially desirable location, since with a barn so located it is possible to have good drainage, a clean, dry basement opening on the ground in the rear, a driveway to the upper floors, and a protected court with warm southern exposure. The main portion of the building, which may have two or more stories, is utilized mainly for the storage of feeds, farm products, etc. It should be constructed with a view to convenience and economy of space, the light frame and balloon style of construction being especially adapted to this purpose. The various farm products, especially those which are to be fed, may with advantage be stored, when first carried into the barn, on the upper floors in order that the subsequent labor of handling in feeding may be lessened. The farm animals of different kinds are provided for on the ground floor, preferably in wings inclosing a central court. In all properly constructed barns, adequate provision is made for proper lighting and ventilation. This is often neglected; yet it is a matter of the greatest importance, especially in the case of horses. If possible, the stalls should be lighted from the rear. Animals cannot be expected to keep in good health if confined in dark, poorly ventilated stalls. An abundant supply of good water is also an essential. Individual troughs are more hygienic than a common trough. However, a tank or trough in the open court, to which all animals may have access, is a common and very satisfactory arrangement. If spring-water or artesian water under pressure is not available, a supply may be provided by storing rain-water in cisterns or by pumping from wells. Windmills are well adapted to the latter purpose, as well as for grinding feed and similar work, for which motive power of some kind is required in all well-equipped barns. Provision should be made for the collection and preservation of both the solid and liquid manure with as little handling as possible. The New England plan of manure cellars or pits under the barn, into which all the manure is dumped and there 'worked over' by swine, is not without its advantages, especially as a means of preserving the manure. (See MANURES AND MANURING.) The plan and construction of a barn will vary with the purposes for which it is to be used—the products to be stored, the stock to be housed, etc. When, from motives of economy, it is desired to build at first a small barn, which is ultimately to be enlarged, it is wise to have a scale drawing made, at the beginning, of the building as it is to be when completed, showing the location of the yard, pig-pens, cow-stalls, sheepfolds, etc. In this case also a substantial frame, well covered, should be the first consideration. A large part of the interior fixtures may be dispensed with temporarily. There is an almost infinite variety in these interior fixtures—stalls, stanchions, etc.—ranging from the very simple and cheap to the very elaborate and costly. Every barn used for the housing of stock, whether costly or cheap, should be provided with one or more box stalls for the use of animals with young. A silo (q.v.) is a valuable adjunct to a barn; it should form part of the structure, and be so located that it will be easy to fill and convenient to feed from.

Bibliography. A fuller treatment of this subject may be found in the following works: Harney, *Barns, Outbuildings, and Fences* (New York, 1870); Halsted, *Barn-Plans and Outbuildings* (New York, 1886); Sanders, *Barn-Building* (Chicago, 1893); Malden, *Farm Buildings* (London, 1896); Coleman, *Stable Sanitation and Construction* (New York, 1897); Hill, "Practical Suggestions for Farm Buildings," United States Department of Agriculture, *Farmer's Bulletin 126* (Washington, 1901). See Farm Buildings.

BAR′NABAS (Gk. Βαρνάβας). The surname given by the Apostles to Joseph, one of the members of the early Jerusalem Church, and interpreted by the author of Acts to mean 'Son of Consolation' (Acts iv. 36), or 'of Exhortation.' He was a Levite and a Cyprian by race, though doubtless, in view of his aunt having her home in Jerusalem, he was at this time a resident of that city. He contributed to the community of goods among the disciples (Acts iv. 36, 37). He was sponsor for Saul (Acts ix. 27), an act which would seen not only to indicate the influential position which Barnabas held among the disciples, but to involve some previous acquaintance between Barnabas and Saul—possibly in Tarsus, where Barnabas, as a Hellenist of Cyprus, might have attended the university. Both of these inferences are borne out by his subsequent commission by the Church of Jerusalem to investigate the work at Antioch, from which place he goes to Tarsus to secure the services of Saul, with whom he remains in Antioch and works for a year. In this Antioch church he also, quite naturally, came to assume a prominent place, being represented at the head of the prophets and teachers who were active there (Acts xiii. 1). Together with Saul, he was commissioned by the Antioch Church to carry up to Jerusalem the relief prepared for the famine-stricken brethren of the city (Acts xi. 27-30), from which journey they returned only to be sent out by the home church upon missionary work for which they had been divinely selected (Acts xiii. 2).

Throughout this first missionary tour, embracing the southern region of Asia Minor, he was the efficient companion of Paul, returning with him to Antioch, where they became involved in the contention started by the bigoted Jews (see Judaizers) regarding the necessity of circumcision as a condition of salvation (Acts xv. 1), a contention to which the Jews had doubtless been aroused by the extraordinary success of the mission among the uncircumcised Gentiles. The question was brought by them before the Apostles and elders (Acts xv. 2). From this journey they returned to Antioch, where they again engaged in the work of the local church, until Paul suggested that they visit once more the churches which they had established on their missionary tour, when, owing to a dispute between them as to the efficiency of Mark in the work, they separated from each other, Barnabas taking Mark with him and going to Cyprus, his native place (Acts xv. 36-39). This dissension was evidently prepared for by the difficulty which occurred in Antioch between Paul and Barnabas, immediately after their return from the council at Jerusalem (Gal. ii. 11-21), where Barnabas is shown to be more or less out of harmony with Paul's broader Gentile views, and is really included with Peter in Paul's severe rebuke. From this time Barnabas disappears from Apostolic history, for Paul's mention of him in I. Cor. ix. 6 merely implies that Barnabas was still engaged in active missionary work, not that he was again in Paul's company; while his reference to him in Col. iv. 10 would seem to indicate his death, since otherwise it is difficult to account for Mark's return to work with Paul.

The traditions concerning his subsequent life—that he proclaimed the Gospel in Rome, even during the lifetime of Jesus; that he was founder and first bishop of the Church at Milan; and that he suffered martyrdom at Salamis, on his native island of Cyprus—are valueless.

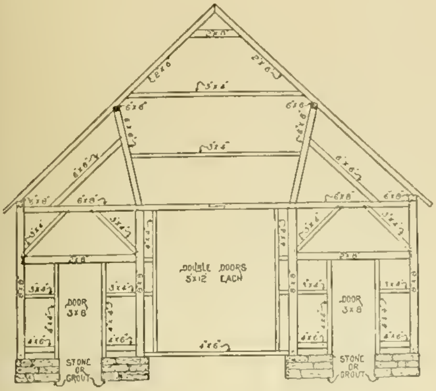
Tertullian assigns to him the authorship of the New Testament Epistle to the Hebrews (see Hebrews, Epistle to the), referring to the current tradition of the Church as so accepting it, and quite evidently implying that he had MS. authority for his view. There is also a pseudepigraphical epistle which has come down to us under his name. See Barnabas, Acts and Epistle of.

BARNABAS, Acts and Epistle of. I. The Apocryphal *Acts of Barnabas*, a work of late date, recounts his missionary tours and his death by martyrdom in his native Cyprus.

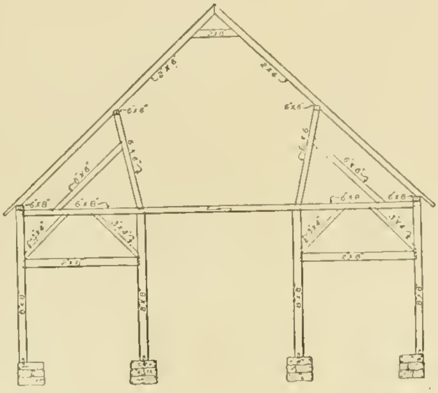
II. The extant *Epistle of Barnabas*, included among the so-called Apostolic Fathers, does not claim to have been written by Barnabas, but it is ascribed to him by early Christian writers, from Clement of Alexandria on. It is a didactic work, full of allegorical interpretations of the Old Testament, and strongly anti-Jewish in its tone. It would seem to have emanated from Alexandria, where, it may be worth while to notice, the Clementine Homilies say that Barnabas resided. The document has been variously dated, from as early as A.D. 70-79 to c.131 (Harnack). The later date is more probable than the earlier.

Bibliography. For text and English translation of the *Epistle*, Lightfoot, *Apostolic Fathers*, ed. Harmer (London, 1893); G. Krüger, *History of Early Christian Literature* (Eng. trans., New York, 1897); A. Harnack, *Chronologie der altchristlichen Litteratur*, Vol. I. (Leipzig, 1897). Consult also: "Barnabas," in Hastings, *Dictionary of the Bible*, Vol. I. (New York, 1898); and id. in Cheyne, *Encyclopædia Biblica*, Vol. I. (New York, 1899).

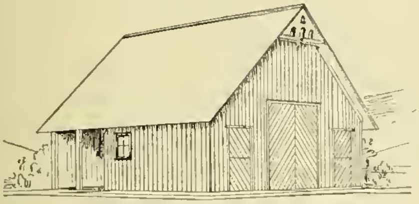
BAR′NABITES. An order of monks which sprang up at Milan about 1530. They were so called because the Church of Saint Barnabas in that city was granted them to preach in. They were approved of by Pope Clement VII. (1533) and Pope Paul III. (1535). Their official title is 'Regular Clerks of the Congregation of Saint Paul.' Their special duties were to attend the sick, to preach, to instruct the young, and to take the charge of souls. They soon established themselves in Italy, France, Austria, and Spain, and enjoyed the privilege of teaching theology in the schools of Milan and Pavia. Many eminent men have been sent forth by them. Besides the



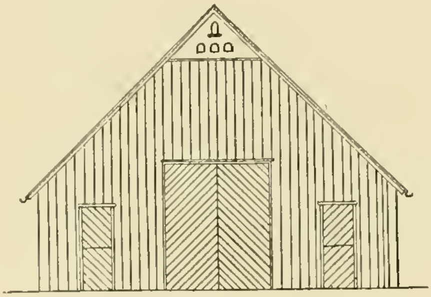
Construction of end bents of $450 barn.



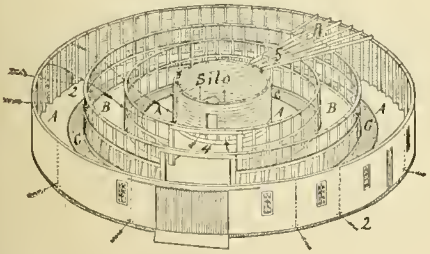
Construction of center bents of $450 barn.



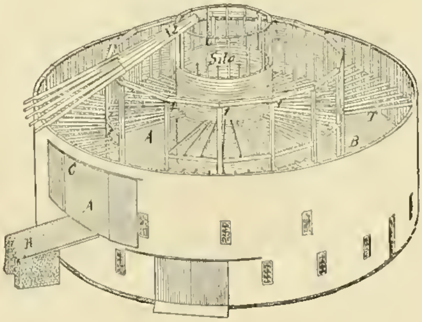
Perspective view of $450 barn.



Front elevation of $450 barn.



CIRCULAR BARN, showing arrangement and construction of first story. A, A, A, A, wagon drain for cleaning barn; B, B, feed manger; C, C, platform for cattle; 2, 2, 4, show method of ventilation; 5, showing method of placing joists.



CIRCULAR BARN, showing arrangement and construction of second story. A, A, barn floor; B, hay bay; T, tool room; C workshop and granary; 1, 1, purline plates and method of placing them; 2, 2, showing method of placing rafters; H, entrance drive.

three usual monastic vows, they took a fourth, viz. not to sue for Church preferments, or to hold any post outside of their order without the Pope's special permission. In France and Austria they were employed in the conversion of Protestants; but they have now, as a body, almost fallen into oblivion. Only a few monasteries exist here and there in Italy and Austria. They were expelled from France in 1880.

BAR'NABY, Sir Nathaniel (1829—). An English naval architect. He was born at Chatham of a family long associated with the Royal Dockyard in that city. He was educated at Chatham, Sheerness, and Portsmouth, where, in 1848, he received the admiralty scholarship. He took part in planning nearly all the war vessels constructed between 1855 and 1885, and was one of the founders of the Institution of Naval Architecture (established 1860). He introduced the change from iron to steel in English shipbuilding in 1872. His principal publication is *Abridgments of Specifications Relating to Shipbuilding, etc., from 1618 to the Present Time* (1862).

BARNABY RUDGE. One of Dickens's novels (1841). It contains an account of the Gordon Riots in London, June 2-7, 1780. The principal character is a half-witted man, who gives the book its name. He is condemned to death as a rioter, but is finally reprieved.

BAR'NACLE. A popular name for the crustaceans of the order Cirripedia, notable for the fact that in their adult form they are always attached to some foreign object, such as ship-bottoms, wharf-piles, floating timbers, rocks, or even whales, or else live parasitically within other crustaceans. The ultimate origin of the word barnacle is unknown, but it was originally applied to the barnacle-goose of northern Europe, and its transfer to these crustaceans was due to the fables formerly current in regard to the reproduction of the bird. (See Barnacle Goose.) Considering the popular ignorance, both of the breeding habits of the geese and of the structure of barnacles, it is not extraordinary that the absurd tales in vogue should have found credence, the crustaceans be regarded as the young of the birds, and the name be transferred to them. Goose-barnacles (*Lepas*) were thus the first cirripeds to which the name was applied, and in Great Britain it is even now restricted to them and to similar stalked forms. Elsewhere, however, the name barnacle is now used for the sessile forms also, and even more broadly as the English term for all cirripeds.

Structure. Barnacles may be broadly defined as attached or parasitic crustacea, with an indistinctly segmented body, surrounded by a mantle, which generally calcifies and forms more or less of a shell or case. As they are attached by the head end, the first pair of antennæ (adhering organs) are very minute, and the second pair are reduced. There are generally six pairs (less frequently three or four) of long, biramous, tendril-like feet, though in parasitic forms these are wanting. There are no heart and no blood-vessels, and gills and other organs of respiration are therefore naturally wanting. Barnacles are generally hermaphroditic, but in some species dwarf males occur, living in the mantle cavity of the normal individuals. In a few species the sexes are separate and dimorphic. In their development, barnacles undergo a most remarkable and very characteristic metamorphosis. The eggs hatch as minute, somewhat triangular larvæ, with three pair of limbs, and a projecting horn or process on each side anteriorly. On the under side of the head is a prominent upper lip. This larva sheds its skin several times as it grows, and finally appears as a larger, but still actively swimming creature, provided with a bivalve shell, like that of a clam. The body is segmented and there are six pairs of biramous feet. The antennæ are modified to serve as organs of adhesion, and a 'cement' gland is formed and opens in their second joint. This larva attaches itself by these antennæ, and after a resting or pupa stage, becomes transformed into the adult barnacle, as a caterpillar changes into a butterfly. There is this important difference between the two processes, however, that a butterfly does not grow, its size being no greater at death than when hatched, while barnacles continue to grow throughout life.

Classification. Barnacles are classified upon the manner of life and the method of attachment. The order Cirripedia is divided into five families, as follows:

(1) *Lepadidæ* having the head end elongated to form a flexible stalk.

(2) *Balanidæ*, without a stalk, but having the body surrounded by a ring of calcareous plates.

(3) *Alcippidæ*, without stalk, or ring of plates, only three or four pairs of feet.

(4) *Proteolepadidæ*, without stalk, plates, or feet.

(5) *Kentrogonidæ*, without stalk, plates, feet, mouth, or digestive system.

The last three of these families are parasitic, and their reduced structure is directly traceable to their mode of life. The anatomy and natural history of barnacles can be most clearly stated by treating each family separately, though it may be said once for all that all barnacles are marine, except a single brackish-water species of *Balanus*.

The *Lepadidæ* take their name from the Greek word λεπάς, a limpet, probably with reference to their being attached forms. The head end is more or less elongated to form the stalk by which the animal is attached. This stalk is fleshy, but tough and flexible; its length varies greatly, up to 10 or 12 inches. Within it are contained the cement gland, with its duct opening at the tip, and, near the base, the ovary, with oviduct opening above in the mantle cavity. The oral portion of the head, the trunk, and the appendages are contained within the mantle, which forms a laterally flattened sac, opening by a slit-like aperture at the upper or outer end, on the ventral side. The mantle is chitinous, but contains, deposited in its wall, the plates of lime which compose the shell. There are five of these plates, a median unpaired one (the *carina*) on the dorsal side, an anterior one on each side (*scuta*), and a posterior one to each side (*terga*). There may also be small accessory plates on each side. The animal is so placed within the mantle that the mouth opens on the upper side of the attached end, the trunk curving backward and upward, and bearing the curious tendril-like feet on the ventral side. These feet are thus above the mouth, and in life project more or less freely from the opening of the shell; they are very flexible, and by their movements are continually bringing particles of food into the mantle cavity and down to the mouth. There is a liver or digestive gland connected with the stomach, but a large part of the trunk is occupied by the male reproductive organs. On the ventral side of the body is a strong muscle, by means of which the shell can be tightly closed. The nervous system consists of a brain and a ventral cord; but sense-organs, other than those of touch, seem to be wanting in all adults, though eyes are present in the larvæ. The Lepadidæ are very widely distributed, but occur chiefly in the warmer seas. They are popularly known as goose-barnacles or goose-mussels, the latter name referring to the superficial resemblance they have to the mollusks known as mussels (q.v.). Although this resemblance is very slight, barnacles were long classed as mollusks because of the presence of a shell. The number of species of goose-barnacles is not large; but, owing to their becoming attached to the bottoms of ships, they are transported from one side of the globe to the other, so that the same species sometimes occurs in the harbors of Europe, Asia, Africa, Australia, and both coasts of America. Naturally, those which attach themselves to rocks or other fixed bodies have a much more restricted range. None of the Lepadidæ are of large size; the body is usually under an inch in length, though the stalk is sometimes ten times as long. The colors are generally inconspicuous—the stalk and mantle pale brown, the calcareous plates pearly blue. None of the Lepadidæ have any economic value.

The *Balanidæ* take their name from the Greek word βάλανος, an acorn, in reference to the shape of the shell. In Great Britain these barnacles are usually called 'acorn-shells,' but the name is not in common use in the United States. The shell is much more fully developed than in the Lepadidæ, and owing to this and the absence of a stalk, they differ superficially from that family to a marked degree. The mantle forms a truncated conical sac, attached by the base, and opening at the upper or posterior end. This opening can be closed by four plates which correspond to the scuta and terga of the goose-barnacles. The mantle itself calcifies into six or more vertical plates, which are broadest at the base, and which can be more or less drawn together at the top, over the scuta and terga. The internal anatomy is very similar to that of the preceding family, but the ganglia of the ventral nerve-cord are fused into a single large ganglionic mass. The Balanidæ are even more widely distributed than the Lepadidæ, and are more abundant in the colder oceans. They often incrust rocks, wharf-piles, and other submerged timbers, and the bottoms of boats, and are frequently found on crabs, mollusks, and other marine animals. They are generally small, less than 2 inches in height; but the largest known barnacle is *Balanus psittacus*, which is sometimes 9 inches high and 4 inches in diameter. This species is of additional interest from the fact that large quantities are gathered on the coast of Chile for food and export. Other species are also eaten, especially by the Chinese, and the Romans regarded some of the Mediterranean forms as great delicacies. The flavor is said to be like that of other crustaceans, as shrimps, lobsters, etc. The shells of the Balanidæ are very hard, and when clean are almost pure white.

The *Alcippidæ* are a very small family of minute species, which live in burrows in the shells of mollusks and some of the larger cirripeds. The mantle lines the burrow, and is attached at one side by a horny disk. The sexes are separate and the females are much larger than the males, which are generally found living within the mantle cavity of the females, but it is not certain that they remain there through life.

The *Proteolepadidæ* are a still smaller family. The species are minute, maggot-like animals, with no limbs, parasitic in other crustaceans. So degenerated is the adult female by its parasitic life, that its body consists only of a sac containing the reproductive organs, attached to the crab by numerous fine root-like processes. On account of these, which have arisen from the head of the young, these animals are also known as *Rhizocephala* or 'root-headed' animals. The best-known genus is *Sacculina*, which has long stood as the extreme example of the degenerating effect of a parasitic life. The members of these last two families of barnacles would never be recognized as cirripeds at all from a study of their anatomy alone. But the study of their embryology and the knowledge of their life histories have revealed clearly their ancestry and relationship; for in early life the larvæ of both these families show the same essential characters as the larvæ of other barnacles, and it is only after they have taken up their abode in their host that the degeneration becomes marked. In *Sacculina*, the males never become attached to a host, but remain in the larval condition throughout life, except for the development of the reproductive organs.

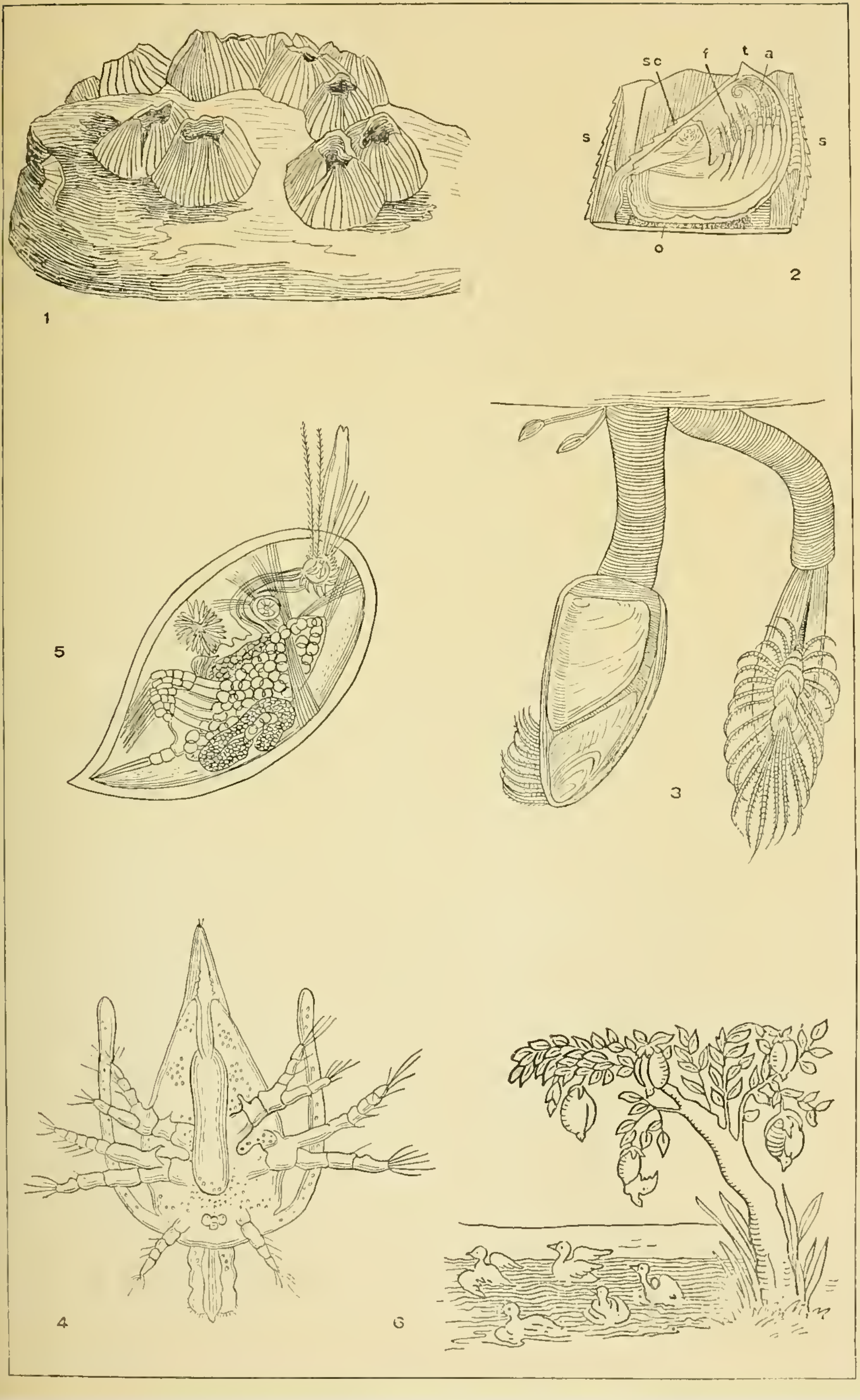
Barnacles have a special historical interest to every biologist, from the fact that the only extensive systematic work in zoölogy done by Darwin was done upon this group. The classical volumes entitled 'monographs' of living and fossil Cirripedia, by Charles Darwin, published by the Ray Society of London in 1851-54, will always be invaluable to students of the Crustacea. Darwin spent eight years on this work, and it illustrates admirably his patience, thoroughness of investigation, and clearness of expression. Another important work on barnacles is Part XXVIII. of the *Challenger* reports; Hoek, *Report on the Cirripedia Collected by H.M.S. Challenger* (London, 1884).

BARNACLE, Lord Decimus Tite. The extremely self-sufficient nobleman who, with his two sons, Clarence and Ferdinand, is in charge of the 'Circumlocution Office' (q.v.), in Dickens's *Little Dorrit.*

BAR'NACLE-EAT'ER. See Filefish.

BARNACLE (prob. *bernicle*) **GOOSE.** A goose (*Branta leucopsis*), common in northern Europe and Greenland, but rare in North America. The name arose from the fables of former days, which represented it as developing from a stalked or 'goose' barnacle. In size the barnacle-goose is smaller than the common wild goose, being only a little more than two feet long and weighing about five pounds. It is very prettily marked, having the forehead, cheeks, and throat white, the bill black, and a black stripe extending from it to the eye; the crown of the head, neck, and upper part of the breast black; the rest of the plumage, on the upper parts of the body chiefly ash-gray and black in undulating bars—on the lower parts white. The white forehead distinguishes this goose from any American species

BARNACLES



1. SESSILE OR ACORN BARNACLE (Balanus).
2. PARTS OF A BARNACLE: *ss*, outer shell with its parts; *sc*, scutum; *t*, tergum; *o*, ovaries; *f*, feet; *a*, thoracic appendages.
3. GOOSE BARNACLE (Lepas anatifera).
4. EARLY LARVAL, OR "NAUPLIUS" STAGE OF A BARNACLE.
5. LATER LARVAL OR "CYPRIS" STAGE.
6. A MEDIÆVAL PICTURE OF THE SUPPOSED BIRTH OF GEESE FROM BARNACLES REPRESENTED AS FRUIT OF A TREE.

This fowl is migratory in Great Britain and most of northern Europe, appearing in the fall and wintering, but passing northward to the Arctic regions to breed. It is much sought after by hunters, and is highly esteemed for the table. Several other species of goose are closely allied to the barnacle, and are often confounded with it, notably the brants (q.v.). In northern Asia the barnacle-goose is replaced by the red-breasted goose (*Branta ruficollis*), a beautiful bird, the neck and upper part of the breast of which are of a rich chestnut red. It is somewhat smaller than the barnacle-goose and is rarely seen in Europe.

The Story of Barnacles and Geese referred to above is one of the most curious in the chronicle of superstition. It appeared, at least earlier than the Eleventh Century, in two forms—one that certain trees, always growing in the water, produced fruit, in form like apples, each containing the embryo of a goose, which, when the fruit was ripe, fell into the water; the other that geese were bred from a fungus growing on floating timber, in which they developed as a worm. The 'fruit' and 'worms' were quickly identified with barnacles that fastened themselves upon floating timber and trees, and many writers declared that they saw the birds inside the shells. Holinshed gravely affirms that such was the case; and the most learned men of their time were weak enough to give credence to the absurdity. Gerard, in his *Herbal* (1597), declares, that after "a thing in form like a lace of silke finely woven, as it were, together"—which he correctly enough states to be "the first thing that appeareth" when "the shell gapeth open"—there next follow "the legs of the bird hanging out;" and at last the bird, increasing in size, "hangeth only by the bill," and "in short space after it cometh to full maturity, and falleth into the sea, where it gathereth feathers, and groweth to a fowl bigger than a mallard, and lesser than a goose," etc. An illustration of the process, reproduced from one of the old *Herbals*, will be found on the Plate of BARNACLES.

All this was represented as constantly taking place on the coast of Lancashire and the Hebrides, while other writers reported the same fabulous birth of geese on the Continent.

One extraordinary and laughable result of this belief was the very learned discussion which took place among theologians as to whether the geese so born were flesh or fish. To the Jews it was important, because the ceremonial manner of killing would be different, if they were fowls, from that if they were fish. The Church wished to settle it in order to know if they might be eaten, as could fish, on Fridays and fast-days. Very high dignitaries took part in the decision of the question, which in the case of the Church was favorable to their being eaten when meat was forbidden; and it has been suggested that the astonishing persistence of this myth was largely due to the selfish influence of the priests, based on regard for this privilege. What was the origin of so *bizarre* a story has been widely discussed. Many theories have been propounded, none of them satisfactory. The latest student of the matter, Mr. Henry Lee, of the Zoölogical Society of London, suggests that 'barnacle' (or bernicle) as applied to the cirriped, and the same term as applied to the bird, have nothing to do with each other, and originated separately. The former is probably a modified diminutive of the Latin *perna*, while the latter originated in the vernacular of Scotland. "To arrive at the origin of the word. . . we must remember," says Lee (*Sea Fables Explained*, London, 1883), "that this bird, *Anser leucopis*, was formerly called 'brent,' 'brant,' or 'bran' goose (see BRANT), and was supposed to be identical with the species (*Anser torquatus*) which is now known by that name. The Scottish word for 'goose' is 'clake,' or 'clakes,' and I think that the suggestion made long ago (Gesner, 1558), by his correspondent Joannes Caius, is correct, that the word 'barnacle' comes from 'branclakis,' or 'barn-clake'—the dark-colored goose. . . I agree with Dr. John Hill (*History of Animals*, London, 1752), that the whole matter that gave origin to the story is that the 'shell-fish' (cirripedes) supposed to have this wonderful production . . . have a kind of fibres hanging out of them, which, in some degree, resemble feathers."

BAR'NARD, Lady ANNE (1750-1825). The author of "Auld Robin Gray" (q.v.). She was born at Fifeshire, Scotland, the eldest daughter of James Lindsey, Earl of Balcarres. In 1793 she married Andrew Barnard, son of the Bishop of Limerick, and secretary to Lord Macartney at the Cape of Good Hope. There Lady Anne lived till 1807, when, on the death of her husband, she returned to London. Her *Letters*, which were published in 1901, are extremely vivacious and entertaining.

BARNARD, Mrs. CHARLOTTE ALINGTON (1830-69). An English ballad composer. She was a pupil of Madame Parepa and Signor Mario, and between 1858 and 1869 wrote, under the pen-name 'Claribel,' nearly 100 ballads, such as "Come Back to Erin," and "Won't you tell me why, Robin?" Many of these songs still retain their popularity. For the most part she wrote the words for her songs, publishing also a volume of *Thoughts, Verses, and Songs*.

BARNARD, DANIEL DEWEY (1797-1861). An American lawyer, born in Sheffield, Mass. He graduated at Williams College in 1818, and in 1821 was admitted to the bar. He was a member of Congress in 1828-30 and 1839-45, and also served in the State Legislature. From 1849 to 1853 he was Minister to Prussia. He published numerous speeches and reviews.

BARNARD, EDWARD EMERSON (1857—). An American astronomer. He was born at Nashville, Tenn., graduated in 1887 at Vanderbilt University (Nashville), and in 1887-95 was astronomer at Lick Observatory, Mount Hamilton, Santa Clara County, Cal. Subsequently he became professor of astronomy at the University of Chicago, and astronomer of the Yerkes Observatory, Williams Bay, Wis. He received, in 1892, the Lalande gold medal of the French Academy of Sciences, and in 1898 was elected a foreign associate of the Royal Astronomical Society of Great Britain. He has obtained excellent results in celestial photography, and discovered sixteen comets and the fifth satellite of Jupiter.

BARNARD, FREDERICK AUGUSTUS PORTER (1809-89). An American mathematician and educator. He was born at Sheffield, Mass., graduated at Yale 1828, and in 1831 became teacher in the Hartford Deaf and Dumb Asylum. He was professor of natural philosophy and mathematics in the University of Alabama, from 1837 to 1848, and of chemistry until 1854, when he took orders in the Episcopal Church. In 1855 he was professor of astronomy and mathematics in the University of Mississippi, and became president of that institution in 1856. He became president of Columbia College, New York, in 1864, and during twenty-four years labored with great success for its advancement. He was United States Commissioner to the Paris Exposition of 1867, and published a report on machinery and industrial arts, in 1869. He wrote a *Treatise on Arithmetic* (1830), *Analytical Grammar with Symbolic Illustration* (1836), *Letters on College Government* (1855), *History of the United States Coast Survey* (1857), *Recent Progress of Science* (1869), *The Metric System* (1871), and various smaller papers. In 1860 he was one of the party sent to Labrador to observe an eclipse of the sun; in 1862 he was at work on the reduction of Gillis's observations of the stars of the southern hemisphere, and in 1863 he superintended the publication of maps and charts of the United States Coast Survey. He was president of the American Association for the Advancement of Science in 1860; a member of the board of experts of the Bureau of Mines in 1865, and a member of the American Institute in 1872. He left the bulk of his property to Columbia College. Barnard College, affiliated with Columbia University, is named after him. Consult: Fulton, *Memoirs of Barnard* (New York, 1896).

BARNARD, George Grey (1863—). An eminent American sculptor, born at Bellefonte, Pa. In 1879 he studied at the Chicago Art School, and for the next three years at the Ecole des Beaux-Arts, in Paris. During the next nine years he continued his studies in his own studio in Paris. In 1894 he first exhibited at the Champs de Mars, his work attracting much attention, and he was elected an associate of the Société Nationale des Beaux-Arts. His chief works are "The Two Natures," in the Metropolitan Museum of Art, New York City; "Sleeping Boy," "Friendship" (a colossal group for a tomb in Norway), "The Hewers:" a clock-case, 12 feet high, carved in oak and illustrating Scandinavian mythology, a remarkable production; "Maiden;" "God Pan:" "Eve;" a large fountain in Tampa, Fla., and another at Cairo, Ill., and busts of Abram S. Hewitt, Collis P. Huntington, and A. M. Barnhardt. He was awarded gold medals at the Paris and Pan-American exposition. In 1896 Mr. Barnard established himself in New York City.

BARNARD, Henry (1811-1900). An American educational reformer. He was born at Hartford, Conn., graduated at Yale in 1830, and was admitted to the bar in 1835. From 1837 to 1840 he was a member of the State Legislature, where his career was marked by his energy in behalf of school and prison reform. Later, as school commissioner of Rhode Island (1843-49), he manifested the same zeal and virtually revolutionized the educational system of that State. From 1850 until 1854 he was superintendent of the Connecticut State schools: from 1857 to 1859 he was president of the University of Wisconsin; from 1865 to 1866 he was president of Saint John's College, Annapolis; and from 1867 to 1870 was the first United States Commissioner of Education. He organized the Bureau of Education, and in his reports suggested or advocated nearly all of the reforms that have since been carried out in our educational system. Dr. Barnard, while secretary of the Connecticut School Board (1832-42), and later while superintendent, published the *Connecticut Common School Journal*, and while in Rhode Island, the corresponding journal in that State. In 1855 he founded the *American Journal of Education*, continuing as editor and chief contributor until 1886, when he published the *American Library of Schools and Education*, a collection of his own treatises numbering over 800 and filling 52 volumes. Dr. Barnard was, perhaps, the greatest of American educational pioneers, and, like Horace Mann and Dr. Bushnell, will be remembered for the enduring heritage he left to the cause of educational enlightenment in this country.

BARNARD, John Gross (1815-82). An American officer and military engineer. He was born in Sheffield, Mass., graduated at West Point in 1833, and was employed as constructing engineer until 1846, rising to the rank of colonel of engineers and brevet major-general. In the Mexican War he fortified Tampico, and in 1851 was chief engineer of the Tehuantepec Survey. He was superintendent of West Point from 1855 to 1856, and for four years was in charge of the defenses of New York Harbor. In the Civil War he served successively as chief engineer of the Department of Washington, as chief engineer (with the rank of brigadier-general) of the Army of the Potomac, and chief engineer on the staff of General Grant. At the close of the war he was brevetted major-general 'for gallant and meritorious services in the field,' and in December, 1865, became colonel of the Engineer Corps. He subsequently was a member of the boards having charge of fortifications and river and harbor obstructions. He published, among other works: *Phenomena of the Gyroscope* (1858); *Dangers and Defenses of New York* (1859); *Notes on Sea-Coast Defense* (1861); *The Confederate States Army and the Battle of Bull Run* (1862).

BARNARD CAS'TLE. A market-town in the county of Durham, England, situated on the Tees, 15 miles northwest of Darlington. On a rocky promontory near the river are the ruins of a castle built in the Thirteenth Century by Barnard Baliol, an ancestor of John Baliol, King of Scotland. There are also a museum and a number of manufacturing establishments. Population, in 1901, 4421.

BARNARD COL'LEGE. A collegiate institution for women, situated in New York City, and affiliated with Columbia University (q.v.). Barnard College proper was organized in 1889, as an indirect result of efforts conducted for some years by Frederick Augustus Porter Barnard and others interested in the higher education of women to induce the trustees of Columbia to admit women to its courses upon equal terms with men. Upon the reiterated refusal of the trustees to go further in this direction than to grant the degrees of Columbia to women able to pass the requisite examinations, a movement was started in 1888 to establish a separate woman's college, which, however, should be affiliated with Columbia. In 1889 the charter for such a college was granted. The arrangements then made with Columbia, providing for a varying amount of exchange instruction between the two institutions, proved unsatisfactory, as Barnard was enlarged, and on January 19, 1900, the connection between Columbia and Barnard was formally fixed as follows: The President of the University to be *ex officio* President of Barnard and a trustee of Barnard; the internal administration of Barnard to be conducted by its Dean, who is entitled also to a vote in the University Council; Barnard to retain its separate corporate existence and Board of Trustees, to provide for its own financial support, and to maintain complete separate undergraduate instruction; all Barnard degrees to be granted by, and in the name of, Columbia; the University Library to be free to Barnard students, and a number of post-graduate courses in Columbia to be open to Barnard graduates.

Although as originally organized Barnard had no further financial resources than the promise of a number of persons to pay a small sum annually for four years, it has been able, through subsequent subscriptions, to meet all the expenses of a rapidly growing college. In 1889 there were 36 students; in the academic year 1891-92 there were 62, and in 1901-02 there were 431, representing an increase during the decade of over 700 per cent. The buildings include Milbank Hall, the gift of Mrs. A. A. Anderson; Fiske Hall, given by Mrs. Josiah M. Fiske, and Brinkerhoff Hall, built mainly by the gifts of Mrs. Van Wyck Brinkerhoff. In March, 1902, the endowment of the college was increased by $500,000, $250,000 being given by Mr. John D. Rockefeller and $250,000 being obtained through numerous other gifts. The present endowment of the college is $750,000, the value of the buildings and grounds is estimated at $700,000, while the total value of the property under the control of the college is $1,500,000. Gross income, $100,000. Miss Laura Drake Gill, A.M., was made dean in 1901.

BARNAR'DO, Thomas John (1845—). An English philanthropist, born in Ireland. While engaged in the study of medicine at London Hospital in 1866, he became interested in the condition of destitute children, and established a place of refuge for them in Commercial Road. Since then nearly 100 of these homes and many mission branches have been opened in various parts of England, Canada, and the Island of Jersey. In the 'Village Home' at Ilford, Essex, 52 cottages have been erected. These cottages are under the supervision of 'mothers,' and girls are reared here as if they were in their own homes. There is also an emigration agency, which provides for the transportation of young people to Canada, where they are furnished with employment. In this way thousands of orphan waifs have been rescued and instructed in useful occupations. Nearly half of these young people have emigrated to Canada and the colonies. Among the publications of Barnardo are the following: *Something Attempted, Something Done;* and *The Rescue of the Waif.*

BAR'NARD'S INN. An inn of Chancery, in London, dating back to 1451. It was destroyed in the last decade of the Nineteenth Century to make room for modern buildings.

BARNA'TO, Barnett (1852-97). An English speculator, the so-called 'King of the Kaffirs,' commonly known as Barney Barnato. He was born in London, of Hebrew parentage. Early in his career he was connected with a circus and with traveling theatrical companies. In 1873 he went to Kimberley, South Africa, and in 1895 organized a remarkable 'boom' in Kaffir mining stock. He was credited with being one of the richest men in the world, and the most successful promoter of financial schemes. He committed suicide in 1897 by jumping from a vessel at sea. Consult Isaacs, *Life of Barnett Barnato* (London, 1897).

BARNAUL, bär'nȧ-ōōl'. The capital of a district in the Government of Tomsk, Siberia, on the left bank of the river Ob, 238 miles southwest of Tomsk, and 2046 miles east-southeast of Moscow (Map: Asia, II 3). It is the administrative seat of the personal domains of the Czar in the Altai, and contains the Imperial Smelting-Works. The annual output of the works exceeds 13,000 pounds of gold, and 5000 pounds of silver (troy). Barnaul's notable institutions are a meteorological station, founded in 1838, a well-equipped mining-school and library, and a public museum, with fine zoölogical and botanical collections. Population, in 1897, 29,408.

BARNAVE, bär'nȧv', Antoine-Pierre Joseph Marie (1761-93). A champion and victim of the French Revolution. He was born at Grenoble, the son of an advocate. He adopted his father's profession, and early attracted attention in the Parlement of Grenoble by the talents which he displayed. A pamphlet which he published against the feudal system led to his being returned as deputy from his province to the States-General in 1789. He zealously advocated the proclamation of the Rights of Man, was vehement in opposition to the absolute veto, carried through the confiscation of Church property to the use of the nation, the emancipation of the Jews, and the abolition of the religious orders, and was mainly instrumental in the liberation of the slaves and reorganization of the colonies. He was the leading member of the Jacobin Club for the first two years of its existence. As a leader of the extreme party in the earlier stages of the Revolution, he became the idol of the people, particularly after his victory over Mirabeau in the question of the power of peace and war, which Mirabeau wished to leave with the King, and Barnave successfully claimed for the National Assembly. With Pétion and Batour-Maubourg he was sent to bring the royal family back from Varennes, where they had been intercepted on their flight to the border. It may be that personal contact with royalty softened his prejudices; but certainly it is true that he subsequently became inclined to a more moderate course, defended the inviolability of the King's person, and resisted the assertion by the National Assembly of power to remove ministers. This conduct led to his being regarded as a renegade from the National party. He retired to his native place on the dissolution of the National Assembly, but after the 10th of August, 1792, he was impeached, with Lameth and Duport-Dutertre, on account of correspondence with the Court; was brought to Paris, tried before the Revolutionary tribunal, condemned, and guillotined on the 29th of November, 1793. Consult Janin, *Barnave* (Paris, 1860).

BARNAY, bär'nī, Ludwig (1842—). A German actor, born at Pesth. He made his début in 1860 at Trautenau, and appeared in his native city the following year, after which he had engagements of varying length in Gratz, Mainz, Vienna, Prague, Riga, Mainz again, Leipzig, and Weimar. From 1870 to 1875 he was at the Stadt-Theater of Frankfort-on-the-Main, and for the next five years at that of Hamburg, where he acted as director. For several years thereafter he traveled as a 'star,' visiting London with the Meiningen Court Company in 1881, and in 1882 making a successful tour in the United States. From 1887 to 1894 he managed his Berliner Theater in Berlin. He has since made his home in Wiesbaden. Barnay's greatest talents have been shown in tragedy. Among his most noted rôles are Essex, Uriel Acosta, Othello, Antony, Tell, and Egmont. He was the leader in the movement which assembled the stage congress at Weimar in 1871, thus being founder of the 'Association' (*Bühnengenossenschaft*), which has proved of such value to the German theatrical profession.

BARN'BURN'ERS. In American political history, a faction of the Democratic party in New York State after 1844, so called (in allusion to a Dutchman who was said to have burned his barn to free it of rats) from their supposed eagerness for radical reform measures—especially for such measures as would prevent the extension of slavery in the Territories. Unable to secure satisfactory recognition in the Democratic National Convention of 1848, they joined the Free Soilers, and with them nominated Van Buren for the Presidency. Their vote, dividing the Democratic strength, secured the election of Taylor, the Whig nominee. In 1852 they reunited with their opponents, the Hunkers, though the two factions did not work together in harmony until several years later. Before this time the name 'Softs,' or 'Soft-shells,' had replaced the name 'Barnburners.' See Van Buren; Hunkers; Albany Regency.

BARN'BY, Sir Joseph (1838-96). An English musician and composer. He was born at York, England, and was educated at the Royal Academy of Music. He was organist at Saint Andrew's and Saint Ann's, was conductor of the oratorio concerts at Saint James's and Exeter Halls; succeeded Gounod as conductor of the Royal Albert Hall Choral Society in 1872; became musical director at Eton College in 1875, and afterwards was elected principal of the Guildhall School of Music. In 1892 he was knighted. Among his numerous and popular compositions the motet, *King All Glorious*, and his oratorio, *Rebekah*, and *The Lord is King*—a setting of the 97th Psalm—are especially noteworthy.

BARN'DOOR' SKATE. The largest of North American skates (*Raja lævis*). It occurs along the Atlantic coast from New England to Florida, and may reach a length of four feet. See Skate.

BAR'NEGAT BAY. An inlet of the Atlantic, in Ocean County, N. J., 23 miles long and 1 to 4 miles wide. It is separated from the ocean by Squan and Island (or Long) beaches. On the north end of the latter is Barnegat City, a famous summer resort (Map: New Jersey, D 4). The beaches are separated by Barnegat Inlet, about one mile wide. At the mouth is a lighthouse, 39° 46′ 48″ N., 74° 6′ 3″ W., with a light 163 feet above sea-level, and flashing white every 10 seconds.

BARNES. A progressive town in Surrey, England, on the right bank of the Thames, 3 miles northeast of Richmond. The municipality maintains parks and a hospital, and owns an electric-lighting plant and artisans' dwellings. Population, in 1891, 14,670; in 1901, 17,800.

BARNES, Albert (1798-1870). An American Presbyterian theologian. He was born at Rome, N. Y.; graduated at Hamilton College and the Princeton Theological Seminary. He was pastor of the First Presbyterian Church, Philadelphia, from 1830 to 1867, and is best known for his *Notes* on the Bible. During the disruption of the Presbyterian Church he was tried for heresy, and in the final separation went with the New School, and was among the most liberal of its leaders. Besides the *Notes*, he wrote an introduction to *Butler's Analogy; Scriptural Views of Slavery* (1846); *The Way of Salvation* (1863); *Lectures on the Evidences of Christianity in the Nineteenth Century* (1868), and a series of Sunday-school manuals.

BARNES, Alfred Smith (1817-88). An American publisher, born at New Haven, Conn. He entered the publishing business in Hartford, Conn., at an early age, and afterwards went to New York (1838), and there published many of Professor Davies's mathematical works. He lived in Philadelphia from 1840 to 1845, and then settled permanently in New York, and began the publication of school-books. The firm has continued this specialty. At his death Mr. Barnes left nearly $100,000 to educational and charitable institutions, $45,000 of it going to the construction of Barnes Hall, the home of the Christian Association of Cornell University.

BARNES, Barnabe (c.1569-1609). An Elizabethan lyrist, son of Dr. Richard Barnes, Bishop of Durham. He was educated at Oxford; was with Essex in Normandy against the Prince of Parma (1591); and took the side of Gabriel Harvey in the quarrel with Thomas Nash. In 1593 Barnes published a volume containing much beautiful verse, *Parthenophil and Parthenophe: Sonnettes, Madrigals, Elegies, and Odes* (reprint by Arber in *English Garner*, 1882); *A Divine Centurie of Spirituall Sonnets* (1595; ed. by Grosart, 1875) is less interesting. His rather remarkable tragedy, *The Divil's Charter*, was performed before King James at Christmas, 1606-07.

BARNES, Charles Reid (1858—). An American botanist, born at Madison, Ind. He received his education at Hanover College, and subsequently studied botany at Harvard. In 1880 he was made professor of natural history at Purdue University, and in 1886 professor of botany at the University of Wisconsin. In 1898 he became professor of plant physiology at the University of Chicago. Besides editing the *Botanical Gazette*, he wrote: *Handbook of Plant Dissection* (jointly with J. M. Coulter and J. C. Arthur, 1886); *Keys to the Genera and Species of North American Mosses* (ed. 1, 1890; ed. 2, jointly with F. D. Heald, 1897); *Plant Life* (1898); *Outlines of Plant Life* (1900); and a number of valuable papers on botanical subjects.

BARNES, James (1806-69). An American soldier, born in Boston, Mass. He graduated at the United States Military Academy in 1829, and was assistant instructor in French there in 1829-30. Subsequently he was in garrison at Forts

McHenry (Md.) and Monroe (Va.). With the rank of first lieutenant of artillery he resigned, and was engaged in railway engineering from 1836 to 1857. During the Civil War he served in 1861-62 as colonel of the Eighteenth Massachusetts Volunteers in the defenses of Washington, and with the Army of the Potomac in the Virginia Peninsular campaign and the Maryland campaign. As a brigadier-general of volunteers he was at the battles of Fredericksburg and Chancellorsville, and commanded a division at Gettysburg. He was brevetted major-general of volunteers in 1865 for meritorious services.

BARNES, James (1866—). An American author. He was born at Annapolis, Md., and was educated at Saint Paul's School, Concord, N. H., and at Princeton, where he graduated in 1891. He was connected with *Scribner's Magazine* for some time, and in 1894-95 was assistant editor of *Harper's Weekly*. Among his publications are: *For King or Country* (1895); *Naval Actions of the War of 1812* (1896); *Yankee Ships and Yankee Sailors* (1898); *The Hero of Erie* (1898); *David G. Farragut* (1899); and *Drake and His Yeomen* (1899).

BARNES, Joseph K. (1817-83). An American surgeon. He was born in Philadelphia, Pa., and was educated at Harvard and the University of Pennsylvania. In 1840 he joined the army as an assistant surgeon, and at the beginning of the Civil War was assigned to duty in the surgeon-general's office. At the close of the war he was surgeon-general, and was brevetted major-general (1865). To him was due a large part of the efficiency of the medical department during the war. He was the founder of the Army Medical Museum and the library of the surgeon-general's office. He attended Presidents Lincoln and Garfield on their death-beds.

BARNES, Joshua (1654-1712). An English classical scholar, born in London. In 1695 he was appointed professor of Greek at Cambridge. Among his best-known works are: *Gerania; or, A New Discovery of a Little Sort of People Called Pygmies* (1675), which is said to have furnished Swift some hints for his *Voyage to Lilliput;* and *᾿Αυλικοκάτοπτρον* (1679), a Greek paraphrase of the Biblical story of Esther. His editions of the Greek classics are no longer used.

BARNES, Thomas (c.1785-1841). An English editor. He was a schoolfellow of Leigh Hunt at Christ's Hospital, graduated in 1808 at Pembroke College, Cambridge, and wrote for the London *Examiner* a series of articles published over the signature 'Criticus.' In 1817 he became editor of the London *Times*, which he firmly established as the foremost of English newspapers. He was a friend of Hunt, Lamb, and Hazlitt; and, as director of the political policy of the *Times*, wielded great influence. "Barnes," says Leigh Hunt in his *Autobiography*, "wrote elegant Latin verse, a classical English style, and might assuredly have made himself a name, in wit and literature, had he cared much for anything beyond his glass of wine and his Fielding."

BARNES, William (1801-86). A poet and philologist, born at Rushhay, Bagber, Dorsetshire. He was for many years master of the grammar school at Dorchester. He was ordained in 1847, and was promoted from the curacy of Whitcombe to the rectory of Winterbourn-Came, in Dorset, in 1862. In the meantime he received the degree of B.D. from Cambridge. He died October 7, 1886. He is the author of three collections of poems written in the dialect of Dorsetshire: *Poems of Rural Life, with a Dissertation and Glossary* (1844); *Homely Rhymes* (1859); and *Poems of Rural Life* (1893). Barnes was a true poet, combining with a genuine love of nature, as seen in the rich grazing-lands of Dorsetshire, a keen sympathy with the rustic population, their hopes and fears, loves, joys, sorrows, and superstitions. It is for this audience that he professed to write. He wrote also a collection called *Poems of Rural Life in Common English* (1868), which contains many attractive pieces. As a philologist, Barnes attempted to restore the ancient English speech. In his *Outline of English Speechcraft* (1878) he substituted for the usual grammatical nomenclature English compounds of his own coining. 'Tenses' became *time-takings;* 'adjectives' *markwords;* and 'grammar,' *speechcraft.* Consult Lucy Baxter, *Life of William Barnes* (New York, 1887).

BAR'NET. A town in Hertfordshire, England, 11 miles north-northwest of London. It was formerly a place of some importance on the Great Northern Coach-Road. Large cattle fairs are held here. Near the town is the site, marked by an obelisk, of the famous battle, fought April 14, 1471, between the Yorkists and Lancastrians, in which the latter, after a desperate struggle, were routed, and their leader, Warwick, 'the king-maker,' killed. Population, in 1891, 6400; in 1901, 7900.

BAR'NETT, John (originally, Beer) (1802-90). An English composer, born at Bedford. He studied under Horn, Price, Perez, Ferdinand Ries, and (at Frankfort) Schneider von Wartensee, and early wrote a considerable number of songs and ballads, of which the best was the setting for the Rev. Charles Wolfe's "Burial of Sir John Moore." In 1834 appeared his *Lyrical Illustrations of the Modern Poets*, a song-collection of unusual merit; and in the same year his opera, *The Mountain Sylph*, was presented in London. With the latter, generally accounted his best work, many mark the beginning of the movement toward the founding of an English school of dramatic music. His *Fair Rosamond*, performed in 1837, failed, through the absurdities of the libretto, of any marked success. From 1841 he was a teacher of singing at Cheltenham. Others of his publications are an oratorio, *The Omnipresence of the Deity* (1830); and a *School for the Voice* (1844).

BARNETT, John Francis (1837—). An English musician and composer, born in London. He studied at the Royal College of Music, London, and the Leipzig Conservatorium; played at a Gewandhaus concert, Leipzig, in 1861, and first attracted attention as a composer by his symphony in A minor, performed in 1864 by the Musical Society of London. His most important work is the cantata, *The Raising of Lazarus*, given for the first time at the Hereford festival of 1876. He became a professor in the Guildhall School of Music, and in the Royal College. Among his other compositions are the cantatas *The Ancient Mariner*, written for the Birmingham festival of 1867, and *Paradise and the Peri*, for that of 1870; *The Lay of the Last*

Minstrel, for orchestra; quartets and quintets for strings; and several pianoforte and vocal solos.

BARNEVELDT, bär′ne-vĕlt, Jan van Olden (1547-1619). A Dutch statesman. He was born at Amersfoort, in Utrecht, and at an early age showed great ardor in the cause of his country's independence. He was an able ally of William the Silent in the struggle against Spain, and after the Prince's death, succeeded, through wise alliances with England and France, in preserving the independence so dearly gained. As Advocate-General of the Province of Holland, he proved equally his insight into public affairs and his address in diplomatic negotiations. Penetrating the secret designs of the young Prince Maurice of Orange, whom he had caused to be made Stadtholder of five provinces, he made himself the leader of the Republican party, which aimed at subordinating the Stadtholder to the Legislature, and saving the Netherlands from a monarchy. It was he, also, who opposed the warlike tendencies of Maurice, and concluded a treaty with Spain (1609) which later saved the country from the horrors of the Thirty Years' War. Maurice of Orange, ambitious and unscrupulous, became Barneveldt's bitterest enemy, and a fierce political struggle was fought out between the two men, under the guise of a religious dispute. The country was, at that time, split up into the rival factions of the Arminians or Remonstrants, who stood for the doctrine of Free Will, and comprised the magistracy of the country, with Barneveldt at their head, and the Calvinists, who were known as Gomarists or Contra-Remonstrants, of whom Maurice, for political reasons, now assumed the leadership. With the view of obviating a civil war, Barneveldt caused an ecclesiastical assembly to be called, which established general toleration. The States at first concurred in this wise measure, but the partisans of the Orange faction brought about a change of views by representing the Remonstrants as secret friends of Spain. Barneveldt was attacked in scurrilous publications, and was insulted, even in the meetings of the States, by the mob whose idol Maurice was. The strife between the Remonstrants and the Gomarists, that is, between Barneveldt and Maurice, finally culminated in violence on the part of the Prince of Orange. On August 29, 1618, Barneveldt was illegally arrested, together with Grotius and Hoogerbeets, and thrown into prison. In November Maurice procured the summoning of the Synod of Dort (q.v.), which condemned the Remonstrants with the utmost rigor. In March, 1619, while the Synod was still sitting, Barneveldt was brought to trial before a special commission of twenty-four judges, unlawfully appointed, who condemned as a traitor the innocent man to whom the country owed its political existence. The friends of Barneveldt, the Princess of Orange, and the French Ambassador interceded for him in vain. On May 13, 1619, the venerable man—the grandest figure of his time—mounted the scaffold and laid down his head with the same firmness that he had shown through all his life. Four years after their father's death, Barneveldt's two sons, Wilhelm and Reinier, took part in a conspiracy against the life of Maurice. The conspiracy was discovered; Wilhelm escaped, but Reinier was seized and beheaded. Consult Motley, *Life of Barneveldt*, of which numerous editions have been published (London and New York, 1874).

BAR′NEY, Joshua (1759-1818). An American naval officer, born in Baltimore, Md. He shipped in 1772 in a brig trading to Liverpool, and subsequently made several voyages to Europe. At the outbreak of the Revolutionary War, he was appointed master's mate on board the sloop-of-war *Hornet*, which was assigned to Commodore Hopkins's squadron and participated in the capture of New Providence, Bahamas. Subsequently he entered on board the schooner *Wasp*, and served on the sloop *Sachem*, the brig *Andrea Doria*, and the frigate *Virginia*. He was captured by the British in 1780, and sent to Mill Prison, Plymouth, England, whence he made his escape in 1781, and came to Philadelphia. In 1782, in command of the *Hyder Ali*, he captured off Cape May the British ship *General Monk*, and in the same year sailed for France with dispatches to Franklin, then United States Minister, concerning the peace negotiations. From 1795 to 1800 he was a commodore in the French service; in 1814 commanded the American flotilla in defense of Chesapeake Bay, and in the same year participated in the battle of Bladensburg. Consult Barney, *A Biographical Memoir* (Boston, 1832).

BARN′FIELD, Richard (1574-1627). An English poet, born at Norbury, Shropshire. His works include *The Affectionate Shepherd*, a pastoral based on Vergil's Second Eclogue (1594); *Cynthia, with certain Sonnets and the Legend of Cassandra* (1595); and *The Encomion of Lady Pecunia*, etc. (1598). The last volume contains "If music and sweet poetry agree," and "As it fell upon a day," which were long attributed to Shakespeare. They were again printed in *The Passionate Pilgrim* (1599). Barnfield's poems were edited by Grosart for the Roxburghe Club (1876), and E. Arber (1882).

BAR′NIVELT, Esdras, Apothecary. The pseudonym of the author of a key to *The Rape of the Lock*. The 'key' has been ascribed both to Pope and to Arbuthnot, and was published in London in 1715.

BARN-OWL. The barn-owl is a familiar species named by Linnæus *Strix flammea*, and conservative ornithologists regard it as almost cosmopolitan in its distribution, counting the slight differences observable in those of Africa, the Orient, Australia, North and South America, as marking merely geographical races; others, however, prefer to separate these local forms into distinct species, and call that of the Americas *Strix pratincola*. It should further be said that the term barn-owl is most often applied in Great Britain to the related tawny owl (*Strix stridula*), while the present species is usually called screech-owl. This type of owl is of comparatively small size (length, about 17 inches), and is characterized by the yellowish-red, irregularly marked plumage of the back, the "silky-white to bright tawny" hue of the under surface, dotted with black spots; and particularly by the heart-shaped form of the facial disks, which meet in a point below the beak, and are fringed with bright rust-color. The eyes are small and black, the legs long and clothed with short feathers only. Its quaint physiognomy has won for it the name 'monkey-faced' in the Southern States.

Range and Breeding.—This owl is occasionally seen over most of the United States, but is most numerous in the southern portion, and thence to Patagonia. It seems to be partly migratory, retreating in winter from its most northerly ranges. In the Old World it breeds mainly in church-towers, ruins, and similar places, and its eerie hoot has contributed much to the poetry and fables connected with its race; but in less civilized, or less ruinous, parts of the world it chooses for a nesting-place a cavity in an old tree, a crevice among rocky crags, or (as very frequently in the southwestern United States) a niche in some steep earthen bank. Even in the United States, however, it makes its home in belfries and stone buildings when it can. The nest is a bed of straw and feathers, and the eggs, four to eight, are white. "This owl," Fisher remarks, "is one of the most distinctively nocturnal of the tribe, but like all the others it can see perfectly well in the brightest daylight, when, for any reason, it is required to leave its retreat. It usually sleeps during the day, sitting upright in a dark nook or crevice, in the shadow of a bridge, or among the dense foliage of some grove or reedy marsh."

Food and Economic Value.—This species is perhaps the most beneficial of its tribe to the agriculturist, because its food consists almost wholly of the small rodents so injurious to him. Naturalists recognize this in all parts of the world. In the United States this owl subsists mainly in the East on rats and wild mice; in the South on the cotton-rat, and certain mice doing great injury there; and in the West on gophers, ground-squirrels, and rabbits, even those so large as the jack-rabbit. Its services in the destruction of cotton-rats and pouched gophers alone would entitle it to gratitude and protection. Consult Fisher, *Hawks and Owls of the United States* (Agric. Dept., Washington, 1893). See Owl, and plate of Owls.

BARNS'LEY. A town in the West Riding of Yorkshire, England, about 21 miles north of Sheffield, on the Dearne (Map: England, E 3). Although the town is of great antiquity, most of its buildings are of a comparatively recent date. It was incorporated in 1869, and maintains public libraries, baths, and markets. It has a large number of educational and benevolent institutions, and a public park of about 20 acres. It is situated within the coal district, and has manufactures of linen, paper, glass, and steel wire. There are also iron and steel foundries and dyeing-works. It is on three railway lines and a canal. The United States has a resident consular agent. Population, in 1891, 35,000; in 1901, 41,000. Barnsley dates from pre-Norman times. Consult Jackson, *History of Barnsley* (London, 1858).

BARNSTABLE, bärn'sta-b'l. A town and county-seat of Barnstable County, Mass., 75 miles southeast of Boston, on Barnstable Bay, and on the New York, New Haven and Hartford Railroad (Map: Massachusetts, G 4). It contains 12 villages, several of which are well-known summer resorts, and is principally engaged in farming, fishing, and cranberry cultivation. Within the town limits are several public libraries and a State normal school. Barnstable was first settled in 1639. In the part called West Barnstable, James Otis, sen., lived, and James Otis, jun., was born. The government is administered by town-meetings. Population, in 1890, 4023; in 1900, 4364. Consult "Annals of Barnstable," in Freeman's *History of Cape Cod*, 2 vols. (Boston, 1860-1869).

BARNSTAPLE, bärn'sta-p'l (locally known as Barum). A town in Devonshire, England, on the Taw, 6 miles from its mouth, and 34 miles northwest of Exeter (Map: England, B 5). The Taw is here crossed by a bridge of the Thirteenth Century, consisting of 16 arches, which has been widened by iron-work on each side. Its noteworthy buildings are a parish church, dating from the Fourteenth Century; the old grammar school, at which the poet John Gay was educated; and some quaint old houses in Bontport Street. Before the silting of the river, Barnstaple was a seaport of some importance. It has manufactures of lace, gloves, and pottery, known as 'Barum-ware.' Barnstaple has existed since the reign of Athelstan, in the Tenth Century, who built a castle here, but was incorporated in the reign of Henry I. Population, in 1891, 13,000; in 1901, 14,100.

BARN-SWAL'LOW. Two distinct species of swallow frequent barns and outhouses in North America, but that to which the name properly applies, and should be restricted, is the fork-tailed one which makes its nest inside the building, while the other, square-tailed one, which nestles on the outside of the walls, should be called eaves or cliff swallow. The barn-swallow proper, then, is the one named by naturalists *Chelidon erythrogaster*, and it is among the most widely familiar birds of the whole Continent. It is lustrous blue above, and below is pale reddish-brown, with the forehead, chin, and throat bright chestnut, bounded by a collar-like band of blue across the breast; the tail is deeply forked, and each tail-feather, except the central pair, has a white spot on its inner web. These swallows arrive from the south, where they have wintered in the tropics, in May, and at once renew our acquaintance, perching in twittering lines upon the roadside telegraph-wires, hawking about our gardens and barn-yards for winged insects, skimming gracefully the surface of river or pond, and alighting upon their soft banks or about puddles in the road to gather pellets of mud with which to construct their homes.

Nesting Habits.—Before the country was civilized, these swallows frequented only such parts of it as had rocky exposures, and they made their nests in niches on the face of a cliff, as they yet do in some remote parts of the western mountains. As soon, however, as stables and sheds were erected by white settlers the swallows took possession, and this increasing and welcome acquaintance with man has continued as civilization pushed west and north, until now a swallow dwelling in aboriginal fashion is a curiosity. The nest is composed of pellets of mud plentifully mixed with straw, and may sit flat upon a frame-beam at a safe height, when it is a simple cup; or it may be plastered, in the form of a hollow bracket, against the rafters or higher walls. Invariably, however, the nest of this species is *inside* the barn or shed. It is bedded with soft grass and feathers, and contains five rather elongated, buff-white eggs, spotted about the large end with reddish and purple dots and splashes. These birds are not only perfectly harmless, and usually warmly welcomed for their beauty and cheer, but they consume a vast number of small insects which are more or less injurious or annoying. It is most unfortunate, therefore, that they seem an object of especial attack by the English sparrows, which not only seize upon many nests for their own breeding purposes, but wantonly tear many others to pieces, destroying eggs and young as if in a spirit of mere malicious mischief. In this way the barn-swallows of the more northerly States and Eastern Canada have been greatly reduced and in some places exterminated. They depart for the south in flocks earlier in the autumn than do most other migrants. See SWALLOW and Plates of SWALLOWS and of EGGS OF SONG BIRDS.

BAR'NUM, PHINEAS TAYLOR (1810-91). An American showman, born at Bethel, Conn. His father was a tavern-keeper; and while attending the village school, Barnum traded with and played practical jokes upon his father's customers. At the age of 13 he was employed in a country store, and at 18 went largely into the lottery business. When only 19, he married clandestinely, and moved to Danbury, where he edited *The Herald of Freedom*, and was imprisoned sixty days for a libel. In 1834 he removed to New York, where, hearing of Joyce Heth, alleged nurse of Washington, he bought her for $1000, and with the aid of forged documents and puffing, exhibited her to considerable profit. Reduced again to poverty, he sold Bibles, exhibited negro dancers, and wrote for newspapers, until he bought the American Museum in New York, which he raised at once to prosperity by exhibiting a Japanese mermaid, made of a fish and a monkey, also a white negress, a woolly horse, and finally a noted dwarf, styled 'General Tom Thumb,' whom he exhibited also in Europe in 1844. In 1847 he offered Jenny Lind $1000 a night for 150 nights. The tickets were sold at auction, a single ticket bringing, in one case, as much as $650; and his gross receipts for 95 concerts were over $700,000. He built a villa at Bridgeport, in imitation of the Brighton Pavilion, and engaged in various speculations, one of which—a clock factory—made him bankrupt. Settling with his creditors in 1857, he engaged anew in his career of audacious enterprises, and made another fortune. Two of his museums having been destroyed by fire in 1865 and 1868, he established in 1871 his 'Greatest Show on Earth,' a traveling circus and menagerie, with many new features. He was an unsuccessful candidate for Congress in 1866, but was four times elected to the Connecticut Legislature. His *Autobiography* (1854, since greatly enlarged) has at least the merit of frankness. In 1865 he published *The Humbugs of the World*, and in 1869 *Struggles and Triumphs*.

BARN'WELL, ROBERT WOODWARD (1801-82). An American statesman. He was born at Beaufort, S. C., graduated at Harvard in 1821, and was admitted to the bar. He was in Congress from 1829 to 1833, and was Senator in 1850-51. After the secession of the Southern States, he was sent as a delegate to the famous Montgomery Convention, and cast the decisive vote in the election of Jefferson Davis. He was also a member of the Confederate Senate and was twice president of the University of South Carolina.

BAROACH, bȧ-rōch'. A town in India. See BROACH.

BAROCCHIO, bȧ-rŏk'kē-ō, or **BAROZZI**, GIACOMO DA VIGNOLA. See VIGNOLA.

BAROCCI, bȧ-rō'chē, or **BAROCCIO**, -chō, FEDERIGO, called FIORE D'URBINO (1528-1612). An Italian painter, born at Urbino. He studied with his father, Ambrogio Barocci, a sculptor, and then under Battista Franco. His first work of importance was a picture of Saint Margaret, painted for his native city. He was then invited to Rome, and did some frescoes in the Belvedere Palace and in the Vatican. His two finest pictures are in the Chiesa Nuova, Rome, the "Visitation" and the "Presentation." Examples of his art may be found in nearly all the galleries of Europe. He painted in the manner of Correggio; but although his work is graceful, it never compares with that master's.

BAROCCO, bȧ-rŏk'kō, or **BAROQUE**, bȧ-rōk' (It., irregular, bizarre). A word used to describe a certain style of architecture or even sculpture of the decadence in Renaissance style. Some writers either confuse it with *rococo* (q.v.) or make the *rococo* style a late division of the barocco period. In Italy, to which the term 'barocco' is made especially to apply, it describes the kind of heavy, tasteless, flaunting style, with overgrown details and outlandish shapes, which succeeded the academic style of a Vignola or the purism of a Palladio. It ruled in most parts of Italy during the Seventeenth and Eighteenth centuries. It was adopted and carried to extremes by the Spaniards. Some late German Renaissance might be so classed, but little in France or in England. It was often characterized by heavy bosses and broken lines. In sculpture the works of Bernini and Borromini, with their artificial exaggerations, belong to this style. The term is also used of any work of art of any period that has these characteristics.

BAROCHE, bȧ'rôsh', PIERRE JULES (1802-70). A French politician. He was born in Paris, where he became an advocate in 1823, and distinguished himself as a pleader. In 1847 he was sent to the Chamber of Deputies from Rochefort. After the Revolution of 1848 he was elected to the National Assembly. He voted at first with the adherents of the Republic, but soon inclined to the Bonapartists, and later favored the policies of Louis Napoleon. In March, 1850, he succeeded Ferdinand Barrot as Minister of the Interior. In April, 1851, he was appointed Minister of Foreign Affairs. He became Minister of Justice and Public Worship in 1863, and a Senator in 1864, and resigned his portfolios in 1869. Upon the downfall of the Second Empire, Baroche fled to Jersey, where he died.

BARO'DA. A fortified city of Gujarat, India, capital of a district, and of the native State of the same name. It is 248 miles north of Bombay, with which it is connected by railway (Map: India, B 4). It stands on the Vishvomitri, which is here crossed by four stone bridges, one of singular construction—an upper range of arches resting on a lower one. Baroda occupies an important position between the coast and the interior, and has considerable trade in the produce of the surrounding districts, grain, flax, cotton, and tobacco. The city is intersected by two wide streets, which meet at right angles in a central market-place. The chief native structures of interest are the old palace, the Naulakhi Well, and the modern Lakshmi Villas palace, which dominates the town. There are several fine European buildings, including the Anglican Church, dating from 1824, the Baroda College, the Anglo-Vernacular School, the Baroda State Library, and the Dufferin Hospital. The town has a splendid modern system of water-works since 1892, supplied from a distance of 18 miles by the artificial lake covering 4.71 square miles. Baroda is the residence of the Gaikwar, a protected Mahratta prince, who, in 1881, replaced Malhar Rao, the preceding ruler, accused of misrule from 1873-75, and suspected of an attempt to poison the British Resident. The State has been tributary to Great Britain since 1802. Population of town, in 1891, 116,400; in 1901, 103,800. These figures include a military cantonment of 5000 troops. Area of State, 8100 square miles. Population, in 1891, 2,415,400; in 1901, 1,953,000.

BAROM'ETER (Gk. βάρος, *baros*, weight + μέτρον, *metron*, measure). An instrument for measuring the elastic pressure of the atmosphere which is sometimes, but erroneously, called its weight. Plato and Aristotle maintained that the atmosphere has weight; Galileo and Torricelli knew that pressing upon the water in a well forced a portion of it to rise up the bore of a pump as fast as the piston rose. The fact that water could not be made to rise more than 33 feet in this manner showed to Galileo's mind the limiting pressure of the atmosphere—namely, about 15 pounds to the square inch.

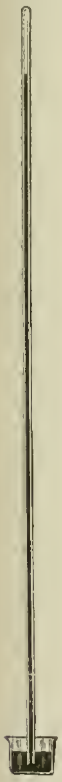


Fig. 1.—Torricelli's Experiment.

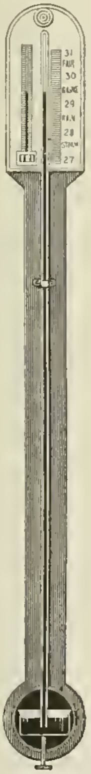


Fig. 2.—Ordinary Household Barometer.

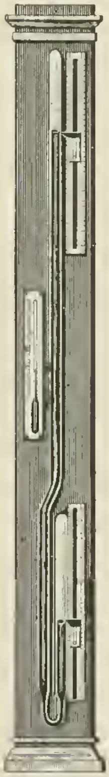


Fig. 3.—Siphon Barometer.

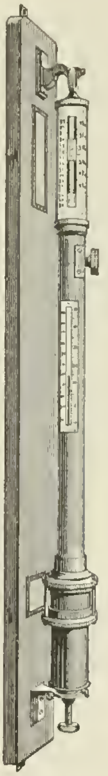


Fig. 4.—Fortin Barometer.

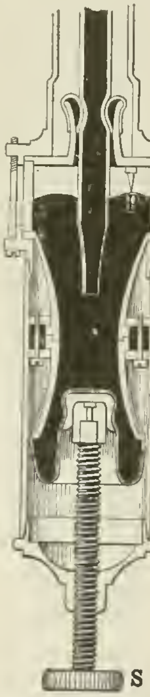


Fig. 5.—Section of Cistern of Standard Barometer. (Green Pattern.)

In 1643 his pupil and successor, Torricelli, desiring to find a convenient method of measuring the variations of atmospheric pressure, asked Viviani to use a short glass tube closed at one end, filled with mercury, and inverted in a basin of that heavy liquid, as in Fig. 1. As he predicted, so it was found that a column of mercury 30 inches high, corresponding to the atmospheric pressure (15 pounds to the square inch), was held up by the air-pressure and the upper portion of the glass tube was empty. This vacant space was called the Torricellian Vacuum. According to Hellmann, this simple apparatus was first called a barometer by Boyle. With the modifications and auxiliary apparatus necessary to secure the accuracy in measurement demanded by modern science, the mercurial barometer is now considered the standard instrument for measuring the elastic pressure of gases. In the normal barometers constructed for the International Bureau of Weights and Measures, maintained at Paris by the contributions of all nations for the purpose of securing accuracy and uniformity in all measurements, provision is made for measuring the temperature of the top and bottom of the mercurial column, the temperature of the metallic measuring-scale, the imperfection of the vacuum, if any, the capillary effect at the surface of the mercury in the basin and in the tube, the verticality of the measuring-scale, the errors of pointing and reading, the exact density of the mercury, and every other source of error that has been suggested. It is supposed that with all these precautions the height of the column of mercury supported by the atmospheric pressure may be determined within the one-thousandth part of an inch, or the thirty-thousandth part of the whole pressure; but of course this accuracy is not obtained in the instruments ordinarily used in physical laboratories and meteorological observatories. Among the important forms of the mercurial barometer may be mentioned the siphon barometer illustrated in Fig. 3. If the diameter of the tube is perfectly uniform, the capillary effects at the upper and lower ends of the column partially neutralize each other, but not entirely so, because the mercury in the lower end is exposed to the air, whose gases very quickly change the character of the superficial film of mercury. The measurement is facilitated by having the upper and lower arms of the tube in the same vertical line as shown in the illustration. In some barometers the mercury of the open end is protected from air and dust by a convenient flexible covering, such as a film of oil, or by tying a loose india-rubber bag over the open end of the tube. In general, the barometric tube should be of large bore, perhaps even a whole inch, in order that capillarity, or surface tension, may have as little effect as possible.

The standard form of portable barometer is that illustrated in Fig. 4, as first constructed by Fortin, and now very generally copied by makers throughout the world. In this form the measuring-scale extends from an ivory point (*p* in Fig. 5) upward, usually as a part of a metal cylinder inclosing and protecting the whole tube. By means of the screw *S* the mercury in the cistern may be raised or lowered until its surface just touches the point *p*. The observer sights across the upper end of the column of mercury and the corresponding reading on the scale is the height of the mercurial column above the point *p*. When this barometer is to be carried about the screw *S* is turned until the mercury completely fills the cistern and is pushed up to the very top of the glass tube. The barometer is then inverted and carried or kept bottom up until wanted. It is quite common for the vacuum-chamber to deteriorate apparently by the occasional introduction into it of small bubbles of air slipping up along the inner side of the tube. In order to prevent this, Bunsen invented a so-called air-trap, which consists simply of introducing into the interior of the tube, below the top of the mercury, a stricture terminating below in a tube of fine-drawn glass, whose small end opens downward beneath the mercury. Any bubbles of air slipping up the tube are almost certain to be caught in this trap and will escape back into the open air when the barometer is turned upside down for transportation. The most accurate barometers and the newest patterns are now made by Fuess, of Berlin, Green, of New York, and Casella, or Negretti & Zambra, of London. The normal barometers of Paris, Berlin, and Saint Petersburg are read by means of reading microscopes so adjusted that some division of the standard scale is seen as reflected from the surface of the mercury of the barometer so that the slightest change of atmospheric pressure alters the position of this reflection. The ordinary barometers of laboratories and meteorological stations are read by means of a vernier (q.v.) sliding up and down the scale, and by sighting across the edge of the vernier plate to the top of the mercurial column. Siphon barometers having a float with index and dial, by means of which the slight movements of the mercurial column are greatly magnified, are not sufficiently accurate to find any place in scientific work.

Barometric pressures are properly expressed only in standard units of force or dynes, but it is more common to express them in inches or millimetres, meaning thereby the force or pressure corresponding to the weight of a mercurial column of that height: but this pressure depends, not merely upon the height of the column of mercury, but also upon its density and on the force of gravity. The former varies with the temperature; the latter varies with latitude and slightly with height above sea-level. Moreover, the surface tension or so-called capillarity of the mercury in the glass tube and the cistern affect the height of the column of mercury. Corrections for these sources of error must therefore be made, and, by vote of the International Congress, meteorologists now follow the example of the physicists in reducing all barometric measurements to the standard density of pure mercury at zero degrees, Centigrade, and to standard gravity at the latitude of forty-five degrees and sea-level. The barometer has many important uses and applications in science, and is constantly employed in hypsometry, or the measurement of heights, meteorology, and investigations in physics. (See METEOROLOGY and HYPSOMETRY.) The mercurial barometer was made to register its own indications by Samuel Moreland as early as 1670 or 1680, and many improved forms have since been devised, registering by the help of photography, electrically, mechanically, or by gravity. The best of these appears to be the sliding-weight barograph, as perfected by Sprung in Germany, and Marvin in the United States. As a substitute for the mercurial barometer, a form called the aneroid (q.v.) was devised by Vidi, and a better form, sometimes called the pressure gauge (see MANOMETER), was devised by Bourdon.

BIBLIOGRAPHY. For many details as to the history and construction of the instrument and corrections for sources of error, consult Abbe, *Treatise on Meteorological Apparatus and Methods* (Washington, 1887). For an interesting account of the invention and development of the barometer, with illustrations showing early instruments, consult Gerland and Traumüller, *Geschichte der physikalischen Experimentirkunst* (Leipzig, 1899). The ordinary student manuals of practical physics contain descriptions of barometers and their use, while further information can be obtained from the circulars and bulletins of the United States Weather Bureau.

BAROMETER, WATER. A barometer in which water is used instead of a column of mercury. As water has about one-fourteenth of the specific gravity of mercury, the pressure of the atmosphere will support a column nearly fourteen times as high, consequently the movement caused by variations in atmospheric pressure will be over a more extended scale. The chief disadvantage of this arrangement is due to the water vapor in the upper part of the tube exerting a pressure on the liquid below, and causing a shortening of the column. The tension of the aqueous vapor depends upon the temperature, and changes in the reading may be produced independent of variations in the atmospheric pressure. Glycerine and sulphuric acid have also been used in similar barometers with much smaller errors.

BARO'MET'RIC LIGHT. A faint electric light produced in the vacuum of a mercurial barometer by swinging the instrument to and fro, causing friction of the mercury against the inside of the tube. The phenomenon was first noticed by Jean Picard of Paris, in 1675, and an instrument to produce this light was devised by John Bernouilli for Frederick I. of Prussia, in 1700. Using an air-pump to produce a vacuum, Francis Hauksbee constructed a jar in which a bright light was obtained by the friction of falling mercury with the glass. A description of the apparatus and his explanation of the phenomenon are given in the *Philosophical Transactions* of the Royal Society of London for 1705 and 1706. Consult, also, Tyndall, *Lessons in Electricity* (London, 1876).

BARON, băr′on (Med. Lat. *baro*, from Kelt. *bar*, man, or AS. *beorn*, OHG. *baro*, man, vassal. The notion of nobility later attached to *baron* came through the intermediate stage: the man of a lord). The title applied to the lowest degree of the English hereditary nobility. The rank of baron forms a species of landing-place, corresponding amongst noblemen, in a certain sense, to that of gentleman at a lower stage of the social pyramid. It was in this sense that the word was used in former times to include the whole nobility of England, because all noblemen were barons, whatever might be the higher grades in the peerage which they occupied. The word 'peer' has recently come to be used with the same signification, perhaps because it is no longer necessarily the case that every nobleman must be a baron, there being instances in which earldoms and other honors have been given without a barony being attached to them, and in which the barony has been separated from the higher degree by following a different order of descent. The general theory of the Constitution, however, still is, that it is as barons that all the peers sit in the Upper House; and it is on this ground that the archbishops and bishops are said to sit in virtue of their baronies. The distinction into *greater* and *lesser* barons was commonly used during the Twelfth and Thirteenth centuries. At first the *greater barons* were those whose estates were considerable enough to be taxed as a *barony* in the Exchequer, who led their own vassals in war, and who received individual summonses from the King to attend his councils and military gatherings; all other tenants in chief were the *lesser barons*, whose summonses and payments were only general. Later, as the royal councils developed into Parliament and this body became more influential, the King called to it from the baronage only the greater barons, and indeed only a select group of them. Thus the *lesser barons* ceased to be called barons at all, and the term was gradually restricted to those who were regularly summoned to Parliament. The custom of conferring the rank of baron by letters-patent, by which it was converted into a mere title of honor, apart from the possession of landed property or of territorial jurisdiction, was first introduced by King Richard II., who, in 1388, created John Beauchamp, of Holt Castle, Baron of Kidderminster. In Germany, the old barons of the Empire or *Freiherren* were for the most part raised to the dignity of *Grafen* (counts) and princes: while the lesser, in place of passing into the ranks of the untitled gentry, as in England, constituted a grade of the lower nobility, to which no duties were assigned and scarcely any political privileges belonged.

When a baron is first summoned to the British House of Lords, a letter in the Sovereign's name directs him to repair to the Parliament to be holden at a special time and place, to advise with the Sovereign, the prelates, and nobles about the weighty affairs of the nation. On the arrival of the new peer, he is presented by two barons to the Lord Chancellor, his patent or writ being carried by a king-at-arms. This is read by the Chancellor, who congratulates him on becoming a member of the House of Peers, and invests him with his robe. The oaths are then administered by the clerk of Parliament and the new baron is conducted to a seat on the barons' bench. Between creation by writ and by patent there is this distinction, that in the case of the former it is necessary for a man actually to take his seat in the House of Lords before the title may vest. On account of the difficulties attending this mode of procedure, creation by writ is practically obsolete. But though creation by patent is in general the surest way of insuring the hereditary character of the peerage, it labors under one disadvantage as compared with a creation by writ—viz. that whereas in the latter case the dignity once assured by possession passes to the heirs of the holder without any words to that purpose, in the former there must be words to direct the inheritance, else the dignity endures to the grantee only for life. Where the patent, again, in place of being silent as to the succession, expressly sets forth that the dignity of baron is for life merely, it was held, in the Wensleydale Case, that it does not make the grantee a lord of Parliament at all.

The coronation and parliamentary robes of a baron differ very slightly from those of an earl. The right of wearing a coronet was conferred on barons for the first time by King Charles II., their head-dress till then having consisted of a cap of crimson velvet, lined with ermine, and having a plain gold band. A baron's coronet as now worn is adorned with six pearls, set at equal intervals on the chaplet. Coronets are worn only on great occasions of State ceremonials. A baron has the title of 'right honorable lord,' etc., and is addressed as 'my lord,' or 'your lordship.' His wife has also the title of 'right honorable,' and is addressed as 'madam,' or 'your ladyship.' The barons of the Exchequer (q.v.) and of the Cinque Ports (q.v.) are examples still existing of the ancient barons by office.

A good article on the baronage will be found in the *Cyclopædia of Political Knowledge* (London, 1853). Consult, also: Stubbs, *Constitutional History of England*, Vol. II. (Oxford, 1891): Cruise, *Treatise on the Origin and Nature of Dignities or Titles of Honor* (2d ed., London, 1832); Pike, *Constitutional History of the House of Lords* (London, 1894); and Badeau, *Aristocracy in England* (New York, 1886). See Peer.

BARON, bȧ-rōn′, Julius (1834-98). A German jurist, born at Festenberg, Silesia. He studied at Breslau and Berlin, and was appointed professor in 1880 at Greifswald, in 1883 at Berne, and in 1888 at Bonn. His works include *De Judiciorum Constitutione in Veteris Saxoniæ Urbibus* (1855), *Die Gesamtrechtsverhältnisse im römischen Recht* (1864); *Abhandlungen aus dem römischen Civilprozess* (3 vols., 1881-87), *Die Börsenenquete* (Berlin, 1894), and *Pandekten* (9th ed., 1896).

BARON, bȧ′rôɴ′, or **BOYRON**, bwä′rôɴ′, Michel (1653-1729). A celebrated French actor and playwright, a pupil and friend of Molière. Endowed with great beauty and an unusually fine voice, he soon became the favorite of the Paris public, excelling both in tragedy and in comedy, but he was inordinately vain of his personal appearance, and was frequently connected with the scandals of the time. He retired from the stage in 1691, and on his reappearance in 1720 had lost none of the great charm and power of his talents. He was stricken with apoplexy while on the stage, and died soon afterwards. He wrote seven comedies, of which *L'Homme à bonne fortune* held the stage over a century.

BAR'ON AND FEME, fēm *or* fäm (Fr. *femme*, woman, wife, from Lat. *femina*, woman). Norman-French words employed at the common law to denominate husband and wife (q.v.). They are rarely used in the United States.

BARON AND FEME. In heraldry, the expression used to designate the bearing by which the arms of husband and wife are carried per pale, or marshaled side by side on the same shield. The husband's arms are always carried on the dexter side. Where the wife is an heiress—i.e. the representative of her father's house—her husband carries her arms, not per pale, but in a shield of pretense; and they are quartered with the paternal coat by the issue of the marriage. See HERALDRY.

BAR'ONET (Fr. dimin. of *baron*). The lowest degree of hereditary honor in Great Britain. The name baronet or bannaret was originally applied to the lesser barons of the kingdom, but passed out of use with time. The order of baronets was created in 1611 by King James I., for the ostensible object of promoting the plantation of Ulster, in Ireland; but in reality for the purpose of refilling his depleted exchequer. The sum exacted, with the fees of honor due to the officers, amounted to upward of £1000 on each patent. Every person, however, who sought the dignity of a baronet was compelled to give proof that he was a gentleman of blood, and had an annual income of more than £1000. It was part of the bargain that no title should be created between a baronet and a baron, and that the number of the former should be permitted to diminish as the families of the original two hundred died out. The latter stipulation was very speedily departed from. Irish baronets were created until 1800, since which period all baronetcies are of the United Kingdom. There is no limit to the creation of baronets but the will of the sovereign. At investiture there is no ceremony. The rank is communicated by patent or writ. According to the patent, the rank may be confined to direct heirs-male; or extended to heirs-male collateral, and sometimes, in default of direct male heirs, to the husbands of heirs-female. The rank of baronet does not raise a person above the rank of commoner. Baronets of Scotland and Nova Scotia were instituted in 1625 by Charles I. for the purpose of encouraging the settlement of Nova Scotia. There are no new additions to this branch of the baronetage; the latest creation having been in 1707, the year of the union of Scotland and England. Though created for a mercenary object, the order of baronet has always constituted a conservative force in the political and social life of Great Britain, consisting as it does of men of wealth and influence.

BARO'NIUS, CÆSAR (1538-1607). An eminent Roman Catholic ecclesiastical historian. He was born at Sora in the old Kingdom of Naples, October 30, 1538, and educated at Naples and Rome. He was one of the first pupils of Saint Philip Neri, who founded the Congregation of the Oratory, of which Baronius became superior in 1593. He soon after became father-confessor to the Pope, apostolical prothonotary (1595), cardinal in 1596, and librarian of the Vatican Library (1597). On the death of Clement VIII., in 1605, and on that of Leo XI., his successor, he was, against his will, voted on for the Papacy. He received 30 votes on the last occasion, and would probably have been elected but for the opposition of the Spaniards, who were indignant with him for his treatise, *De Monarchia Sicula* (cf. F. J. Sentio, *Die Monarchie Sicula* [Freiburg im Br. 1869]), in which he denied the genuineness of the document attributed to Urban II., on which the Spaniards based their claim to spiritual jurisdiction over Sicily, which had already been weakly attempted by Muzio in 1570. Having already evinced his great diligence and learning as a Church historian, he was commissioned by Philip Neri to prepare the Roman Catholic counterpart to the Protestant "Magdeburg Centuries" (q.v.). Baronius entered upon this commission with great energy and in a position most favorable for access to authorities, composing his *Annales Ecclesiastici a Christo nato ad annum* 1198 (12 vols., Rome, 1588-1607), in which work he labored till his death, June 30, 1607. His polemical purpose affects his use of material, but still the material itself is so enormous and often so recondite that his work is a storehouse of learning of permanent value. He made many mistakes of all kinds, of course, especially in chronology. These were to a considerable extent corrected by A. F. Pagi. O. Raynaldus and others prepared a continuation of the *Annals* down to 1646. The best edition of the *Annals* is that by A. Theiner (Bar-le-Duc and Paris, 1864-83, 37 vols.), but as it is not complete, the one best to use is that by Mansi (Lucca, 1738-57). Both editions contain Pagi's corrections and the continuation, although the latter is of inferior value.

Consult: Rauschen, *Jahrbücher der christlichen Kirche unter dem Kaiser Theodosius dem Grossen: Versuch einer Erneuerung der Annales Ecclesiastici des Baronius für die Jahre 378-95* (Freiburg im Br. 1897); Baronius's *Martyrologium Romanum* (1586) is also worthy of separate mention. There is a life of Baronius by Hieronymus Barnabeus (Rome 1651, 2d ed., Vienna, 1718).

BARON MUNCHAUSEN, mŭn-chą'sen. See MÜNCHHAUSEN.

BAR'ON OF BEEF. A large piece of beef, consisting of both sides of the back, or a double sirloin, and weighing, according to the size of the animal, from 50 to 100 pounds. This monstrously large piece of beef, roasted, is served only on particular festive occasions at the English Court, and at great public entertainments. When served according to ancient custom at civic feasts in Guildhall, London, the 'baron' is honored with a distinguished place on a kind of elevated rostrum, where it is ceremoniously carved for the assembled guests. The term 'baron' probably originated in a fanciful allusion to the word 'sirloin,' inasmuch as a *baron* is superior in rank to a *sir*.

BARON OF THE EXCHEQ'UER. The honorary title of the judges of the Court of Exchequer in England. Originally the revenue board of the Crown, attended by the great men of the realm, the Exchequer, in the course of time, became one of the three ordinary tribunals, sharing with the King's Bench and the Common Pleas the common law jurisdiction of the kingdom. Its judges, however, whether peers of the realm or not, continued to be distinguished by the title of Baron. See COURTS.

BARONS' WAR. See MONTFORT, SIMON DE.

BAR'ONY (OF. *baronie*). A term of somewhat indefinite signification in the feudal system of land tenure. We know that it was compounded of many knight's fees held directly of the King by a single title, and that it was, therefore, usually of great extent; and we know also that the holder, or 'tenant,' of a barony was a baron, a peer of the realm, and entitled to a seat in the Parliament. But whether all manors (see MANOR) were capable of being held as baronies, or only great manors, or whether the term was limited to an estate made up of several manors, commonly known as an 'honor' (q.v.), we do not know. It is certain that every lord of a manor who was entitled to hold a court-baron (q.v.) was not a baron in the strict sense of the term, any more than he was a lord in the strict sense of that term. But a barony, however constituted, always involved the idea of a general jurisdiction to be exercised through courts maintained by the lord of the estate. It was decided in 1660 that baronies by tenure were extinct in England, and could not be revived, and this decision was reaffirmed by the House of Lords in the celebrated Berkeley Peerage case in 1863. Consult Pollock and Maitland, *History of English Law* (2d ed., Cambridge, Eng., and Boston, 1899).

The term *barony* is also applied to the hereditary title or degree of nobility which in England entitles the holder to a seat in the House of Lords. See BARON.

BAROTSE, bȧ-rŏt'sē. A former kingdom of South Africa, now a part of Rhodesia (q.v.).

BAROZZI, bȧ-rŏt'sē, GIACOMO. See VIGNOLA.

BARQUISIMETO, bär'kē-sē-mā'tō. An episcopal city, capital of Lara, Venezuela, on the Barquisimeto River, 90 miles southwest of Puerto Cabello (Map: Venezuela, D 2). The city is in a plain; 2000 feet above sea-level, and is regularly built.' It is the seat of a college and other educational institutions, and has several fine buildings, among which are the Government palace, the barracks, the cathedral, and the market. It is the centre of a fertile agricultural and stock-raising district, and controls important commercial interests, owing to its excellent transportation facilities. Barquisimeto, one of the oldest settlements made by the Spaniards in America, was founded in 1552. It was almost completely destroyed by the great earthquake of 1812, and suffered severely during the War of Independence and the later civil wars. From 1830 to 1881 it was the capital of the State of the same name. Population, in 1891, about 30,000 (with the district); in 1899, about 40,000.

BARR, AMELIA EDITH (HUDDLESTON) (1831—). An Anglo-American novelist. She was born at Ulverston, England, March 29, 1831, and married Robert Barr in 1850. In 1854 she removed to Texas, and in 1869 to New York, where she took up literature as a calling. She has written some thirty novels, among them *Romance and Reality* (1872); *Jan Vedder's Wife* (1885); *A Daughter of Fife* (1886); *A Bow of Orange Ribbon* (1886); *Friend Olivia* (1891); *Birds of a Feather* (1893); *The Lone House* (1894); *Bernicia* (1895); *A Knight of the Nets* (1896); *Trinity Bells* (1899); *The Maid of Maiden Lane* (1900); *Souls of Passage* (1901); and *The Lion's Whelp* (1901). She is best in historical tales, with a flavor of religious persecution, and in scenes of Scotland, the North of England, and Dutch New York.

BARR, ROBERT (1850—). An English novelist, born at Glasgow, Scotland. He was educated at the Normal School of Toronto, Canada, was headmaster of the Central School, Windsor, Ontario, and in 1876 became a member of the staff of the *Detroit Free Press*, in which his contributions appeared under the signature 'Luke Sharp.' In 1881 he removed to London, to establish there the weekly English edition of the *Free Press*, and in 1892 joined Jerome K. Jerome in founding the *Idler* magazine, from whose co-editorship he retired in 1895. In 1898 he came to the United States. Barr displays much shrewd observation in *A Woman Intervenes* (1896), a story of love, finance, and American journalism. He has essayed the historical novel in the *Countess Tekla* (1899). *In the Midst of Alarms* (1894; revised, 1900), a story of the attempted Fenian invasion of Canada in 1866, has enjoyed wide popularity. Other publications are: *In a Steamer Chair* (1892); *The Face and the Mask* (1894); *The Unchanging East*, travels (1900); *The Victors* (1901); and *A Prince of Good Fellows* (1902).

BAR'RA. A small island near the southern extremity of the Hebrides, Scotland, belonging to Inverness-shire. It is 8 miles long and 2 to 3 miles broad, with deep inlets of the sea. The inhabitants (about 2500) are Roman Catholics, and speak Gaelic. Their main occupations are cattle-raising and fishing. South of Barra is situated the islet of Berneray, with the highest lighthouse in Great Britain, 683 feet above high water, and visible for 33 miles.

BARRACKPUR, bär'rak-pōōr' (Eng. *barrack* + Skt. *pur*, city). A native town and military cantonment in Bengal, British India, on the east bank of the Hugli, 15 miles north of Calcutta (Map: India, E 4). Population, 18,000. From the salubrity of its air, Barrackpur is a favorite retreat for Europeans from Calcutta, and is the country residence of the Governor-General. Barrackpur is historically prominent among the mutinous centres of 1824 and 1857. See INDIA.

BAR'RACKS (Fr. *baraque*, It. *baracca*, Sp. *barraca*, a tent; origin uncertain). A permanent structure for the housing of troops, as distinguished from temporary cantonments or camps. In England the practice of billeting or quartering soldiers on the citizens had in 1792 become a great burden; added to which was the effect on the morals of the community, caused by the dissolute character of the soldiery of the period. Consequently, George III. obtained the consent of Parliament for the construction of new barracks, not without considerable opposition, however; as it was urged that the liberty of the subjects might possibly be endangered by separating the soldiers from the citizens, and placing them in the hands of the ruling power. At first, barracks were built without much regard to the health of the troops, the only consideration apparently being their local usefulness. In the United States, great care is taken in the selection of site and in the building of military barracks or forts. Good elevation, water, and clean environment are of the first importance; after which, in the design and construction, an abundant supply of fresh air is made an important factor. Care is taken that each man shall have at least 800 cubic feet of air space, and in hospitals, 2000 feet or more. In a room to be occupied by 30 men, at least 60,000 cubic feet of fresh air per hour should be admitted, and provision is made for this amount. The name is used as a part of the official designation of a number of important military posts in the United States, the best known of which are: Columbus Barracks, Jackson Barracks, Jefferson Barracks, Madison Barracks, Plattsburg Barracks, San Diego Barracks, and Washington Barracks, which are described under their appropriate heads.

BARRACUDA, băr′rȧ-kōō′dȧ (native name). (1) A large, pike-shaped, predatory, marine fish of the teleost family Sphyrenidæ (allied to the mullets), occurring in all tropical and subtropical seas, and common on both coasts of America. The great barracuda or picuda (*Sphyræna barracuda*) frequents our Southern coasts. "It sometimes," says Dr. Theodore Gill, "attains a length of 8 feet and a weight of about 40 pounds. Such large fishes are said to be as much dreaded as the great sharks, and their formidable armature [of teeth] renders them capable of inflicting severe and even fatal wounds. It is, of course, a carnivorous fish, and destructive to the finny tribes generally. As a food fish it is under suspicion, and is, indeed, a species under the ban in the Cuban markets, as there have been repeated instances of severe sickness caused by eating its flesh. It seems, however, only under special conditions that the flesh is poisonous, for generally it can be eaten with impunity, and is quite savory." See Plate of Mullets.

The barracuda of the southern California coast (*Sphyræna argentea*) is 3 feet long, and an important food fish, caught in summer, and especially esteemed when dried and salted. The species seen in the North Atlantic, the becuna (*Sphyræna spet*), is smaller.

(2) The snook of the Cape of Good Hope.

BARRA DO RIO NEGRO, bär′rȧ dȯ rē′ȯ nā′grȯ. See Manáos.

BARRAMUNDA, băr′rȧ-mŭn′dȧ (native Australian name). An extraordinary lung-fish (*Ceratodus Fosteri*) of the rivers of Queensland, Australia, where it is sometimes called native salmon, on account of the reddish hue of its flesh, and also flathead. It is an ugly, dark-colored creature, 3 to 6 feet long, looking more like a huge salamander than a fish, though clothed with large scales. It frequents muddy ponds and streams, feeding on fallen leaves and decayed vegetation, and occasionally goes on shore; and it produces eggs in a gelatinous envelope like those of amphibians. Its flesh is highly prized by the aborigines. The principal interest of it lies in the fact that its two species represent a family, Ceratodontidæ, constituting an order, Monopneumona, of dipnoans. Fossil remains show that in the early ages the family was distributed nearly all over the world, but now it is restricted to Queensland. See Dipnoi.

BARRANDE, bȧ′räɴd′, Joachim (1799-1833). An eminent French geologist and paleontologist; born at Saugues, in the Department of Haute-Loire. He made a special study of the Silurian formations in Bohemia, on which he wrote his principal work, *Système silurien du centre de la Bohême* (1852 and 1887), and his investigations brought out much new and valuable information concerning the trilobites. His works include, *Colonie dans le bassin silurien de la Bohême* (1860); *Documents sur la faune primordiale et le système taconique en Amérique* (1861); *Représentation de colonies de la Bohême dans le bassin silurien du nord-ouest de la France* (1853); and *Céphalopodes, Etudes générales*.

BARRANQUILLA, bär′rän-kē′lyȧ. A seaport of Colombia, situated on the Magdalena River, near its mouth in the Caribbean Sea (Map: Colombia, C 1). The town is not very well built, but is the terminus of the river traffic, as the Magdalena is not navigable at its entrance into the sea. Barranquilla is connected with the coast by a railroad to the port of Sabanilla, 14 miles to the northwest, and is the seat of a United States consulate. The large number of river steamers bring prosperity to the town. Population, 40,000.

BARRAS, bȧ′rȧs′, Paul François Jean Nicolas, Count de (1755-1829). A distinguished character of the French Revolution. He was born in Provence, and in his youth served as a lieutenant against the British in India. He eagerly joined the Revolutionary party, but was not, as is generally but erroneously stated, a member of the States-General in 1789. He was actively concerned in the storming of the Bastile and the Tuileries, and was appointed administrator of the Department of Var, and afterwards of the county of Nice. In the Convention he voted for the execution of the King, without delay or appeal, and on May 31, 1793, declared against the Girondists. The siege of Toulon, and the triumph of the Revolutionary party in the south of France, were in a great measure owing to his activity and energy; and after the victory he was deeply concerned in all the bloody measures that were adopted. Yet he was hated by Robespierre and the Terrorists as one of the less-decided Revolutionists; and their overthrow was accomplished mainly by him, the Convention appointing him commander-in-chief, and virtually investing him with a dictatorship for the time. While holding this high office, in which he acted with great decision and vigor, and on the same day on which Robespierre fell (9 Thermidor, July 27, 1794), he paid a visit to the Temple and provided for the better treatment of the King's son. He hastened also to the Palais de Justice, and suspended the order for the execution of a large number of persons who had been condemned to death. On subsequent occasions, as president of the Convention, he acted with decision both against the intrigues of the Royalists and the excesses of the Jacobins; and on 13th Vendémiaire (October 5, 1795), being again appointed commander-in-chief by the Convention, he called his young friend Bonaparte to his aid and crushed the sections with merciless discharges of artillery. The Directory being appointed in November, 1795, Barras was nominated one of the five members, and in this capacity he procured the nomination of Bonaparte as commander-in-chief of the army in Italy. It was he who arranged the marriage of Bonaparte with the widow Beauharnais. On 18th Fructidor (see FRUCTIDOR; FRANCE), September 4, 1797, when the Royalist intrigues were crushed by Napoleon, he was again invested with the dictatorship. His authority now became preponderant in the Directory, and he affected the pomp of a king, and began to give splendid entertainments in the Palace of the Luxembourg. This continued for about two years, till the decline of the power of the Directory. After the 30th Prairial (June 18, 1799), Sieyès and he had the whole executive power in their hands; and while Barras secretly negotiated, it is said, with the Bourbon princes, demanding a large reward for their restoration, Sieyès, in secret understanding with Bonaparte, brought about the Revolution of 18th Brumaire (November 9, 1799), which replaced the Directory by the Consulate. Notwithstanding the favors he had formerly conferred on Bonaparte, he was now, perhaps unavoidably, an object of suspicion to him; was compelled to remove from the neighborhood of Paris; resided in Brussels, then in Marseilles; was banished to Rome, and then sent to Montpellier, being kept under constant surveillance of the police, and actually found to have been engaged in conspiracies for the restoration of the Bourbons. After the Restoration he returned to Paris and purchased an estate in the neighborhood, where he died. After remaining inaccessible for nearly seventy years, his memoirs were published in Paris and New York, 1895-96. They are of the first importance in throwing light on the history of the Revolution.

BAR'RATRY (Fr. *barateria*, Low Lat. *barataria;* cf. Eng. *barter*, OF. *barater*, *bareter*, to deceive, cheat, barter). At the common law, the offense of frequently stirring up groundless suits and quarrels. Common barratry is rated as a public nuisance, and is punishable, generally, as a misdemeanor. It is not a crime for a man to bring frequent lawsuits without success, unless they are vexatious and without reasonable cause. Nor does the institution or instigation of a single groundless and malicious suit make the wrongdoer a common barrator, although his act may amount to the offense of champerty (q.v.) or maintenance (q.v.), and may render him liable to a civil action for damages. In order to convict him of barratry, proof must be given that he has excited groundless litigation in at least three instances. If the offender is an attorney, he may be disbarred as well as punished criminally. Consult Pollock and Maitland, *History of English Law* (2d ed., Cambridge, Eng., and Boston, 1899).

BARRATRY. In maritime law barratry is any wrongful act willfully committed by the master or crew of a vessel with intent to defraud the owner or charterer; every palpable violation by him or them of trust to the prejudice of the ship and cargo. Negligence does not amount to barratry, unless it is so gross as to constitute fraud. Barratry may be insured against. In *bills of lading* it is excepted frequently from the shipowner's liability. In the absence of such exception, the shipowner is liable for the barratry of his agents and servants to the cargo owner. A willful breach of blockade, or sailing out of port without paying port dues, whereby the ship and cargo become liable to forfeiture, is barratrous. Consult Arnould, *Treatise on the Law of Marine Insurance and Average* (7th ed., London, 1901).

BARRE, bär'rē. A city in Washington County, Vt., 6 miles southeast of Montpelier, on the Vermont Central and the Montpelier and Wells River railroads (Map: Vermont, E 5). It is widely noted for its large granite interests, and contains the French Public Library, Goddard Seminary, and Spaulding High School. Barre was settled about 1788, was organized as a town in 1793, and was chartered as a city in 1894. Under the charter of 1895, the government is vested in a mayor, elected annually, and a city council, of which the mayor is a member. The city owns and operates its water-works. Population, in 1890, 4146; in 1900, 8448.

BARRE, bär'rȧ. An important group of tribes of Arawakan stock, occupying the Upper Rio Negro in northwestern Brazil, and the Casiquiari, Guainia, and Atabapo, in the adjacent region of Venezuela. Owing to their superior activity and aggressiveness, they are said to be absorbing the neighboring tribes, so that within the last century their language has become general throughout a wide area.

BARRE, bär, ANTOINE JOSEPH LE FÈVRE DE LA. See LA BARRE.

BARRÉ, ISAAC (1726-1802). A British officer and politician, born at Dublin. He was a lieutenant-colonel in Wolfe's army, and was wounded at the capture of Quebec in 1759. He was chosen to Parliament in 1761, and attracted attention by a violent personal attack upon Pitt, who led the opposition to Bute's administration. He opposed the Stamp Act in 1765, supported the appeal of the Colonies, and strenuously defended the American cause, for years making himself conspicuous in the various debates by his remarkable powers of invective. The "Sons of Liberty" derived their name from a chance allusion to the Americans in one of his speeches. He held various offices of importance, and was in Parliament until 1790, when he retired in consequence of blindness resulting from his wound received at Quebec. He was among those to whom the authorship of the Junius Letters was attributed.

BAR'REL (It. *barile;* Fr. *baril* = *barrique*, Gael. *baraill*, Ir. *bairile*, Slav. *barilo*). Primarily, a large vessel for holding liquids, and then a certain *measure*, but varying in every locality and almost for every liquid. In the old English measures, the barrel contained 31½ gallons of wine, 32 of ale, and 36 of beer, the wine gallon itself differing from that of ale and beer. In imperial gallons, their contents would be: Old wine barrel = 26¼ gall.; ale barrel, 31½; beer, 36½. The Italian *barile* varies from 7 to 31 English gallons; the French *barrique* of Bordeaux = 228 French litres = 50 English gallons. Four barriques make a tonneau. In many cases, barrel signifies a certain *weight* or other quantity of goods usually sold in casks called barrels. In the United States, flour and beef are sold on the large scale in barrels. A barrel of flour must contain 196 pounds; of beef, 200 pounds. A barrel-of-butter is 224 pounds; of soft soap, 256 pounds; of tar, 26¼ gallons.

BARREL, Gun. See Ordnance and Small Arms.

BARREL BULK. A measure equal to five cubic feet, or one-eighth of a ton. It is used in estimating capacity for freights, 40 cubic feet being taken as one ton in estimating freight charges, where the latter are not based upon the weight.

BAR′REL-MAK′ING MACHIN′ERY. See Cooperage.

BARREL-ORGAN. A musical instrument generally portable, in which the music is produced by a revolving barrel or cylinder, set with pins and staples, which open valves for admitting wind to pipes from a bellows worked by the same revolving cylinder. The pieces are played with an harmonic accompaniment. Barrel-organs are mostly used by itinerant musicians, and their repertoire is limited. The *orchestrion* is a very large barrel-organ, established chiefly in restaurants, dancing-halls, and carrousels.

BARREL VAULT. An architectural term for a continuous semi-circular vault, preferably called tunnel vault. See Vault.

BAR′REN IS′LAND. A volcanic islet in the Bay of Bengal, 60 miles east of Middle Andaman Island (Map: Burma, B 4). It is conical in shape, about 2 miles in diameter, and its cone rises to a height of 1158 feet. The volcano is in a semi-dormant state, emitting at intervals water and sulphurous gases.

BARREN MEAS′URES. See Carboniferous System and Coal.

BAR′RENNESS. See Sterility.

BARRÈS, bâ′rĕs′, Maurice (1862—). A French novelist, born at Charmes-sur-Moselle. His early works, *Sous l'œil des barbares* (1888); *Un Homme Libre* (1889), and *Le jardin de Bérénice* (1891), are obscure, uneven, and decadent, seeking to represent a state of mind repelled alike by the naturalism of Zola and the altruistic sentiment of the Neo-Catholic reaction, and manifesting, rather, a morbid search for singularity and the national love of system. In his later work, especially in *Les déracinés* (1897), Barrès works himself out of aristocratic dilettantism and writes the 'romance of national energy,' urging young men to remain in the provinces and build up national traditions. He preaches the gospel of brotherhood as eagerly as he did that of egotism, and perhaps as earnestly.

BAR′RETT, Benjamin Fisk (1808-92). An American Swedenborgian minister. He was born in Maine, and graduated at Bowdoin in 1832, and at Harvard Divinity School in 1838. He was pastor of the First New Church (Swedenborgian) in New York from 1840 to 1848, at Cincinnati from 1848 to 1850, and at Philadelphia from 1864 to 1871. There he also edited the *New Church Monthly.* His works include a *Life of Swedenborg* (1841); *Lectures on the New Dispensation* (1878); *Letters on the Divine Trinity* (1873); *The Golden Reed* (1855); *A New View of Hell* (1886), and editions of Swedenborg's writings.

BARRETT, Lawrence (1838-91). An American actor, born at Paterson, N. J. For a time he worked in a dry-goods shop at Detroit, Mich., and in that city, in 1853, as Murad in *The French Spy,* made his first stage appearance. In 1857-58, at New York and Boston, he supported Edwin Booth, E. L. Davenport, and other prominent players. In 1861 he enlisted in the Federal Army as captain in the Twenty-eighth Massachusetts Volunteer Infantry. Subsequently he became the leading member of Edwin Booth's company during a remarkable series of performances at the Winter Garden, New York City. For several years he managed, with heavy pecuniary loss, the Varieties Theatre, New Orleans, La., but in 1869-70 won brilliant artistic and financial success as co-partner with John McCullough of the California Theatre, San Francisco. At Booth's Theatre, New York City, he appeared in 1875 as Cassius and the King, in magnificent revivals of *Julius Cæsar* and *King Lear.* In 1884 he was favorably received during a brief visit to England. From 1887 until his death, he was associated with Edwin Booth in one of the most significant enterprises in the history of the American drama. His greatest part was that of Cassius; but he was likewise highly effective as Hamlet, King Lear, Shylock, Richelieu, Lanciotto, and the Man o' Airlie. In general, it may be said that his work was marked by fine conscientiousness and high intellectual force, although not credited by the critics with the touch of distinctive genius displayed by his co-worker, Booth. He was an energetic manager, did much to encourage dramatic authorship, and wrote a discriminating and very readable *Life of Edwin Forrest* (1881).

BARRETT, William Fletcher (1844—). An English physicist, born in Jamaica, West Indies. From 1862 to 1866 he was assistant to Professor Tyndall at the Royal Institution, London; in 1867 was appointed instructor in science at the International College; in 1869 lecturer in physics at the Royal School of Naval Architecture, and in 1873 became professor of experimental physics at the Royal College of Science, Dublin. He helped found, in 1882, the Society for Psychical Research, whose purpose was defined as "an organized attempt to investigate that large group of debatable phenomena designated by such terms as mesmeric, psychical, and spiritualistic." In 1885 he established in the United States a branch of the society. He is known for original investigations in magnetism and radiant heat, which include discussions of the contraction of nickel by magnetization, sensitive flames, and the recalescence of iron. His publications, in addition to numerous contributions to the *Philosophical Magazine* and other periodicals, include *Lessons in Science* (1880); *A Monograph on the So-called Divining Rod* (1897-1900); *Early Chapters in Science* (1899); and valuable reports in the *Transactions* and *Proceedings* of the Royal Society of Dublin.

BARRETT, Wilson (1846-1904). An English actor, manager, and playwright. He was born in Essex, February 18, 1846, and went upon the stage at Halifax in 1864. After playing in different provincial towns, he was for a time manager of the Amphitheatre, at Leeds, and of other playhouses. In 1879, three years after his first appearance in London, he took the management of the Court Theatre there, the next year securing Madame Modjeska for her first English appearance. He became manager of the Princess's Theatre in 1881, and produced that autumn *The Lights o' London*, which held the boards for 286 nights. In 1882 came *The Silver King*, with Barrett's rôle of Wilfred Denver, which had an even longer run, and, like the other, has been repeatedly revived. His *Hamlet* was first presented in London in October, 1884. This was his best Shakespearean part, the other most notable being *Othello* (1897). In 1886 he produced *Clito*, a tragedy written by himself in collaboration with Sydney Grundy. His own drama of *Nowadays*, he brought out in 1889, and his *Pharaoh*, at Leeds, in 1892. The most successful of his own plays was *The Sign of the Cross*, founded on legends of the early Christian martyrdoms under Nero. Produced in America in 1895, it met with great popular favor, and though severely dealt with by some of the critics, had a run of considerably more than a year at the Lyric Theatre, London, which Barrett took in 1896. There, in February, 1897, he produced his *Daughters of Babylon*. He also produced his own adaptations of several well-known novels, among them Hall Caine's *Deemster* (as *Ben My Chree*, 1888); *The Bondman* (1893); and *Manxman* (1894); and Sienkiewicz's *Quo Vadis?* (at Edinburgh, May, 1900). Besides his dramatic writings and various contributions to periodicals, he was author or joint author of several works of fiction, among them novels based on *The Sign of the Cross* and *Daughters of Babylon*.

He was well known in America, having come here for more or less extended tours in 1886, 1888, 1889, 1893, and 1897. In 1898 he visited Australia. In 1899 he became manager of the house so long under Henry Irving's immediate direction, the Lyceum. Consult Scott, *The Drama of Yesterday and To-Day* (London, 1899).

BARR'HEAD. A police burgh in Renfrewshire, Scotland, 3½ miles southeast of Paisley (Map: Scotland, D 4). Cotton-mills, engineering, and other works, combined with its railway facilities, make it a busy and thriving town. It was founded in 1773. Population, in 1891, 8200; in 1901, 9900.

BAR'RI, GIRALDUS DE. See GIRALDUS DE BARRI.

BARRIAS, bä'rē'äs', FÉLIX JOSEPH (1822—). A French artist, born in Paris. He studied under Léon Cogniet, and in 1844 took the *grand prix de Rome* with "Cincinnatus Receiving the Deputies of the Senate." One of his best-known works is "Exiles Under Tiberius" (1851, Luxembourg Gallery). He has also executed frescoes in the Grand Hôtel du Louvre, and the churches of Saint Eustache and the Trinité (Sainte-Geneviève Chapel).

BARRIAS, LOUIS ERNEST (1841-1905). A French sculptor, born in Paris. He was a pupil of Cavelier and Cogniet. In 1865 he won the Prix de Rome. He gained his first noteworthy success in 1871 with the "Spartacus" for the Tuileries Garden. Among his later works are the Carnot Memorial for Bordeaux (1896) and the bronze statue of Lavoisier for Paris (1900).

BAR'RICADE' (Fr., Sp. *barricada*, literally, made of barrels, from *barrica*, barrel). An improvised defensive work, employed to bar narrow passages, streets, roads, etc. When built by regular troops, use is made of beams, chains, *chevaux-de-frise*, and other specially adapted materials; if erected by civilians or mobs, any available material that may be at hand is used. Barricades have been used since the earliest times, but are perhaps better known in connection with the insurrections in the city of Paris. After his ascension to the throne Napoleon III. widened the principal streets of Paris and laid them with asphalt, so as to render the successful erection of barricades next to impossible.

BARRICADES, THE DAYS OF THE. A phrase applied to popular uprisings in Paris. The first was May 12, 1588, when the people rose against the Duc de Guise and barricaded the streets; another, August 5, 1648, when the people rose at the commencement of the Fronde; others, again, in July, 1830, and in February, 1848.

BAR'RIE. The capital of Simcoe County, Ontario, Canada, 56 miles north-northwest of Toronto, on Lake Simcoe (Map: Ontario, D 3). It has gas and electric lighting, waterworks, a collegiate institute, schools, churches, and manufactures of woolen goods, stoves, leather, flour, and pumps. It is a favorite summer resort, and the starting-point of the Lake Simcoe steamers. The United States has there a consular agent. Population, in 1891, 5550; in 1901, 5919.

BARRIE, JAMES MATTHEW (1860—). A Scottish novelist. He was born at Kirriemuir, Scotland, May 9, 1860. He graduated from Edinburgh University in 1882, when he became a journalist, and soon gained notice by his clever delineations of Scottish village life. He has written *Better Dead* (1887); *Auld Licht Idylls* (1888); *When a Man's Single* (1888); *A Window in Thrums* (1889); *My Lady Nicotine* (1890); *The Little Minister* (1891); *An Auld Licht Manse* (1893); *Sentimental Tommy* (1896); a continuation bearing the title of *Tommy and Grizel* (1900); and *Margaret Ogilvy* (1896). He has also written several dramatic pieces—*The Professor's Love Story* (1892); *The Barrister* (1899); *The Wedding Guest* (1900)—and several volumes of miscellaneous papers and short stories. Barrie is the most important figure in a group of recent writers who have taken for subjects the pathos and humor of homely Scotch life. Stories of a similar kind had been written long before by John Galt and others, but they had been forgotten by the public. Barrie has more pathos and humor than any of his predecessors or contemporaries in this style of fiction. Consult: Barrie, *Novels, Tales and Sketches*, author's edition, 8 vols. (London, 1897); and Hammerton, *James Matthew Barrie and His Books* (London, 1900).

BARRIÈRE, bä'ryâr', JEAN FRANÇOIS (1786-1868). A French publicist, born in Paris and educated at the Academy of Saint Barbe. He held various journalistic positions, and in 1833 became associated with the *Journal des Débats*, to which, until his extreme old age, he was one of the most active contributors. He devoted himself principally to historic sketches and studies of the Eighteenth Century and the Revolutionary period. Among his principal works are the following: *Mémoires de Mme. Campan* (1823); *Bibliothèque des mémoires relatifs à l'histoire de France pendant le XVIIIe siècle*, 12 vols. (1846-49).

BARRIÈRE, THÉODORE (1823-77). A French dramatic author, born in Paris. His first notable success was a dramatization of Murger's *Scènes de la vie de Bohême* (Variétés, 1851). This was followed by two other of his best plays—*Les filles de marbre* (Vaudeville, 1853) and *Les faux bonshommes* (1856). Besides these, Barrière has written a great number of plays, alone and in collaboration with E. Capendu, Ed. Plouvier, V. Sardou, and others.

BAR′RIER FORTS, The. A series of batteries built by the Chinese on the Chu-kiang River, several miles south of Canton, and so named because at this point, during the 'Opium War' with England in 1840-42, a barrier of heavy piles and sunken vessels was constructed to keep out foreign shipping. On November 15, 1856, the Chinese fired without provocation on several American officers, including Captain (later Rear-Admiral) A. H. Foote, who were approaching the forts in an open boat; and in retaliation, Commodore Armstrong, then commanding the American fleet in Chinese waters, captured the forts by storm, after an energetic bombardment, on the 21st, the Americans losing 29 in killed and wounded, the Chinese fully 300. The incident caused no interruption in the friendly relations between the United States and China. The forts were subsequently demolished by the Chinese.

BARRIER REEF, The Great. A chain of coral reefs off the eastern coast of Queensland, Australia (Map: Australia, H 2). It extends northward from Cape Sandy, in latitude 24° 40′ S., to Torres Strait, a distance of 1250 miles, and is separated from the mainland by a channel 10 to 150 miles wide. The chain is intersected by numerous inlets, some of which are wide enough for the passage of steamers, as the Olinda Entrance, in latitude 11° 20′ S., and the Raines Inlet, in latitude 11° 40′ S. The sea between the coast and the reefs is calm, and the channel is used by steamers, but is dangerous for sailing vessels. The reefs protrude above the surface at low tide, and even at high tide, when invisible, their location is indicated by the turbulent state of the water. The area covered by the reefs is estimated at 100,000 square miles. Pearls, pearl-shells, and trepang are obtained from the reefs and surrounding waters. Consult Saville-Kent, *The Great Barrier Reef of Australia* (London, 1893).

BARRIERS, Battle of the. A battle fought between the French and the Allied troops under the walls of Paris, March, 1814, in which the latter were victorious. It was after this battle that Napoleon abdicated.

BARRIER TREA′TY. A treaty framed in 1715 after the Peace of Utrecht, confirming treaties concluded between England and the Netherlands in 1709 and 1713. It was guaranteed that Holland should have the right of garrisoning the fortified places of the Belgian Netherlands, Austria to pay a subsidy for the expenses incurred. The parties to it were the Emperor, the King of England, and the States-General of the United Provinces. Consult Dumont, *Corps diplomatique* (Amsterdam, 1726-31).

BARRILI, bär-rē′lē, Antonio Giulio (1836—). A popular and highly prolific Italian novelist. He was born at Savona, December 14, 1836, took part in the campaign of 1859, and later served under Garibaldi during 1866-67. Abandoning his first profession—that of law—for journalism, he became in 1860 editor of *Il Movimento*, and in 1872 of *Il Caffaro*, which is still the best-known journal of Genoa. Four years later he was elected to the Italian Chamber of Deputies, and in 1889 was made professor of Italian literature at the University of Genoa. Since 1865 he has published upward of 60 volumes, including romances, comedies, poems, addresses, and critical studies. Among his many novels, the best known include: *I misteri de Genova* (1867); *Il libro nero* (1869); *Semiramide* (1873); *Cuor di ferro e cuor d'oro* (1877); *Il tesoro di Golconda* (1879); *Dalla rupe* (1884); *Scudi e corone* (1890); *Diamante vero* (1897); *Raggio di Dio* (1899). Barrili writes stories for the stories' sake. Realism, psychology, the problem novel, are matters which have had slight practical influence upon his literary methods. But his volumes of criticism, such as *Il rinnovamento letterario italiano* (1890), show the attention with which he watches current literary movements, even though he does not follow them.

BARRINGER, băr′rĭn-jẽr, Rufus (1821-95). An American lawyer, born in Cabarrus County, N. C. He graduated at the university of his native State; studied for the bar, and afterwards settled at Concord to begin the practice of the law. He was elected to the Legislature in 1848, and became a State senator in 1850. Although strongly in favor of the continuance of the Union, he nevertheless, when the Civil War broke out, cast in his lot with his native State, joined a cavalry regiment, and gradually rose to the rank of brigadier-general. After the war, during which he had taken part in more than 70 engagements, and had been seriously wounded several times, he returned to the practice of law at Charlotte, where he remained until 1884, when he retired from the bar, and thereafter until his death devoted himself to the management of his farm.

BAR′RING-OUT′. A prank once common among schoolboys in Great Britain. On the eve of vacation the boys would attempt to bar the master out, it being understood that if they succeeded in preventing his entrance for three days they might dictate terms regarding holidays and recreation for the ensuing year. But if they failed, they were at the master's mercy. Even the gentle Addison is reported by Johnson to have been a leader in an escapade of this kind at Lichfield. Though not unknown in the United States, barring-out has been here practiced for pure mischief, with no hope of ulterior reward.

BAR′RINGTON. A seaport of Shelburne County, Nova Scotia, Canada, at the head of Barrington Bay, 173 miles west of Halifax by rail (Map: Nova Scotia, D 6). It has a resident United States consular agent, ship-building and fishing industries, and a shipping trade. Population, 1500. Barrington Passage, a small fishing suburb and the railway station for Barrington, communicates by ferry with Cape Sable Island, which lies at the entrance to the bay.

BARRINGTON, Daines (1729-1800). An English lawyer and antiquary. It is said that he was educated at Oxford, but he took no degree. He was called to the bar at the Inner Temple, from 1751 to 1753 was marshal of the High Court of Admiralty, and in 1764 became recorder of Bristol. From 1778 to 1785 he was second justice of Chester. He also held appointment as King's counsel and as commissary-general of the stores at Gibraltar. He was at one time deeply interested in Arctic exploration, and through the Royal Society prevailed upon the Government to dispatch an unsuccessful expedition of two ships. His antiquarian papers, read before the Society of Antiquaries and the Royal Society, deal with a multitude of varied subjects, from the antiquity of playing cards to Julius Cæsar's landing in Britain. His learning was more extensive than accurate, and his curious blunders, due often to his gullibility, exposed him to no little ridicule. His edition (1773) of Alfred the Great's Anglo-Saxon version of *Orosius*, with a translation, has been discredited. The best-known and most valuable of his writings is the *Observations on the Statutes* (1766), a discursive work, with no evidence of arrangement, but still valuable for its ingenious and learned notes. He corresponded with Gilbert White, of Selbourne, whose *Natural History*, it has been asserted, was prepared at his suggestion. After he had become a bencher of the Inner Temple, he was much in the Temple Gardens, where he was familiar with Charles Lamb, who calls him "another oddity," and says that " he walked burly and square." Consult Nichols, *Literary Anecdotes of the Eighteenth Century* (9 vols., London, 1812-15).

BARRINGTON (properly, **WALDRON**), George (1755-c.1840). An Irish author, born at Maynooth, County Kildare. He attended schools there and at Dublin, and in 1771 joined a band of strolling players. Subsequently he set up in London as a polite pickpocket, his most noted professional exploit being the theft from Prince Orloff of a snuffbox roughly valued at £30,000. He was sentenced in 1790 to seven years' transportation, but during the voyage to Botany Bay he frustrated an attempted mutiny, and in 1792 received the first emancipation warrant ever granted. He was long superintendent of convicts, and afterwards high constable at Paramatta. For the opening of the theatre at Sydney with the presentation by the convicts of Dr. Young's *Revenge*, he wrote the prologue containing the well-known lines—

> "True patriots we, for be it understood,
> We left our country for our country's good."

He published *A Voyage to Botany Bay* (1801); *The History of New South Wales* (1802); and *The History of New Holland* (1808).

BARRINGTON, John Shute, First Viscount (1678-1734). An English lawyer and polemical writer. He was born in London, and was educated at the University of Utrecht, where he remained for four years. After his return to England in 1698 he published two treatises, *An Essay Upon the Interests of England in Respect to Protestants Dissenting from the Established Church* (1701) and *The Rights of Protestant Dissenters* (1704-05). He was one of the commissioners sent to Scotland to win the support of the Presbyterians for the union between the two kingdoms, and in 1708 he was appointed a commissioner of customs. He was a member of the House of Commons from 1715 to 1723. Swift described Barrington as "the shrewdest head in England." He was the author of numerous religious essays, collected and published by the Rev. George Townsend, under the title of *The Theological Works of the First Viscount Barrington* (3 vols., 1828).

BARRIOS, bär'rē-ōs, Justo Rufino (1835-85). A Guatemalan politician, born at San Lorenzo. In 1871 he was prominent in the overthrow of President Cerna, and under President Granados became commander-in-chief of the Army of Guatemala. He was President of Guatemala from 1873 until his death. Despite many dictatorial measures, he did much to promote civil order and prosperity. He attempted to unite the five Central American States in a confederation; but Salvador, Nicaragua, and Costa Rica leagued against him, and during an invasion of Salvador he was killed at Chalchuapa.

BAR'RISTER (earlier *barester*, *barraster*, from *barre*, bar). The distinctive name by which the advocates at the English and Irish bars are known. (See Bar.) They are admitted to their office under the rules and regulations of the Inns of Court, and they are entitled to exclusive audience in all the superior courts of law and equity, and generally in all courts, civil and criminal, presided over by a superior judge. In the county courts attorneys are allowed to practice without the assistance of counsel; also at petty sessions, though at the quarter sessions where four counsel attend, the justices always give them exclusive audience. In Scotland the same body are styled advocates, and they have the same exclusive privileges that barristers enjoy in England and Ireland. Of barristers there are various ranks and degrees, and among each other they take precedence accordingly, the general name, 'counsel,' being, in the practice of the court, common to them all. But they may be divided into two leading groups—barristers and King's counsel. The ancient order of sergeants-at-law, formerly a well-marked third group, was distinguished by the *coif* and other peculiarities, but has now ceased to exist. (See Serjeant-at-Law.) Besides these three orders or gradations of rank at the English bar, the Crown sometimes grants letters-patent of precedence to such barristers as his Majesty may think proper to honor with that mark of distinction, whereby they are entitled to such rank and pre-audience as are assigned to them in their respective patents. Persons who desire to become barristers must secure admission to one of the Inns of Court, and, after keeping a prescribed number of 'terms,' must pass a 'call examination' successfully, and thus entitle themselves to be called to the bar. The fees which the candidate must pay on being called, before signing the roll of barristers in the King's Bench Division of the High Court of Justice, are quite onerous, ranging from £90 to £100. He remains subject to the discipline of his Inn, which has the power to 'disbar' him upon criminal conviction or for gross professional misconduct.

The professional ethics, or etiquette, of the bar is carefully and accurately defined. Its principal rules are as follows: "(1) That fees are divided between a leader (who ought to be a King's counsel, a sergeant, or a barrister with a patent of precedence) and a junior in the proportion of three-fifths to the former and two-fifths to the latter; (2) that no barrister accepts business upon a circuit to which he does not belong, except for a special fee; (3) that all litigious business must come through a solicitor, though a barrister may advise a client, directly and personally, as to non-litigious matters (such as making his will, or a settlement of his property); (4) a barrister's fee is an *honorarium*, not recoverable by legal process." As a barrister cannot enforce payment for his services, the law exempts him from liability for negligence in the performance of his professional services.

There is no distinct order of counsel corresponding to barristers in the United States, the functions of counsel, or advocate, and of attorney, or solicitor, being performed by the same person.

BARROIS, bȧ'rwä', Charles (1851—). A French geologist and paleontologist. He was born at Lille, and was educated at the university there, where he afterwards held the chair of natural sciences. He had charge of the official geological corps in Brittany, and has contributed important papers descriptive of the geological structure and the fossils of that region. He has been an active member of the Société Géologique du Nord, and of the Société Géologique de France, and has served as general secretary, and as secretary of committees of the International Geological Congress. Among his literary contributions to the sciences are: *Traité de Paléontologie*, 5 vols. (Paris, 1883-93), which is a translation of Zittel's *Handbuch der Paläontologie*. The following monographs embody the results of part of his researches on the geological formations of France and the neighboring countries: *Le terrain crétacé supérieur de l'Angleterre et de l'Irlande* (1876); "Les terrains anciens des Asturies et de Galice," in *Mémoires Soc. Géol. du Nord*, Vol. II. (Lille, 1882); "Faune du calcaire d'Erbray (Loire-Inférieure), contribution à l'étude du terrain dévonien de l'ouest de la France," in *Mémoires de la Société Géologique du Nord*, Vol. II. (Lille, 1889); "Mémoire sur le terrain crétacé du bassin d'Oviédo (Espagne)," in *Annales des Sciences Géologiques*, Vol. X. (1879); "Mémoire sur la distribution des graptolites en France," in *Annales de la Société Géologique du Nord* (Lille, 1892); "A Geological Sketch of the Boulonnais," in *Proc. of the Geologists' Association*, Vol. VI., pp. 1-37 (1880); "Sondages aux environs de Lille," in *Annales de la Société Géologique du Nord*, Vol. XXVI., pp. 17-33 (Lille, 1897).

BAR'RON, James (c.1768-1851). An American naval officer. He was born in Virginia, went to sea at an early age, commanded several merchantmen, and in 1798 entered the United States Navy as first lieutenant. In 1806 he was promoted to be commodore, and in the following year commanded the *Chesapeake*, when that vessel was attacked and forced to surrender three of her crew, alleged to be British deserters, by the British frigate *Leopard*. (See Chesapeake, The.) Barron, though only in part to blame for the tame submission of his vessel, was bitterly attacked throughout the country, was tried by court-martial, and found guilty of "neglecting, on the probability of an engagement, to clear ship for action," and was suspended from active service for five years. Though he was subsequently assigned to shore duty, he never afterwards was in active service, and never regained his old professional status. Believing himself to be the victim of persecution at the hands of a cabal of officers, headed by Decatur, he challenged the latter, and on March 22, 1820, mortally wounded him in a famous duel at Bladensburg, Md. Barron, though also seriously wounded, finally recovered, and in 1839 became the senior officer in the United States Navy.

BARRON, Samuel (1763-1810). An American naval officer. He was born at Hampton, Va., and was the brother of James Barron. He commanded a fleet of ten vessels in the operations against Tripoli in 1805, but in consequence of ill-health resigned his command in favor of Commodore John Rodgers. Just before his death Barron was made commander of the Gosport Navy Yard.

BARROS, bär'rôs, Arana Diego (1830—). A Chilean historian, born at Santiago. He was forced by ill-health, in 1849, to abandon the practice of the law, for which he had been prepared, gave himself up to historical studies, and became known as an authority on the history of his country. He was a constant traveler, and collected information from all possible sources on his favorite subject. In 1863 he was made rector of the Instituto Nacional. Among his publications are *Estudios históricos sobre Vicente Benavides y la campañas del sur 1818-21* (Santiago, 1850); *Historia de la independencia de Chile* (1854-58); *Historia de la literatura* (1870); *Histoire de la guerre du Pacifique* (Paris, 1881, written by order of the Government); and *Historia general de Chile* (12 vols., Santiago, 1884-93).

BARROS, João de (1496-1570). One of the most important of the early Portuguese historians, for both his conscientious use of original sources and the excellence of his style. He was born at Vizeu and became page to the Crown Prince (afterwards John III.), for whose amusement he wrote his three-volume romance, *Cronica do Emperador Clarimundo* (Coimbra, 1520). After the accession of King John III., Barros was appointed successively captain of the fortress São Jorge de Mina, Governor of the Portuguese possessions in Guinea, and in 1533 treasurer and general agent for Portuguese India. In 1539 he received from the King a grant of a province in Brazil, but an attempt to colonize it proved so ruinous that he was glad to return the grant. He died in 1570. Barros's chief work was his *Decadas*, a history of Portuguese India, written in fulfillment of a royal commission. The first 'decade' was the product of nine years' labor, and appeared in 1552; the second followed shortly after; the third, not until ten years later; while the fourth remained unfinished at his death and was brought out a whole generation afterwards by his successor, Diogo do Couto, who added eight more volumes. A complete edition appeared at Lisbon in 24 vols. (1778-88). Consult Manoel Severin de Faria, *Vida de João de Barros* (Lisbon, 1624).

BARRO'SA, or **BOROSA**, A village of Spain, 16 miles south-southeast of Cadiz, celebrated as the place where General Graham, in March, 1811, with a handful of English troops, succeeded in gaining over the French, after his Spanish allies had retreated, one of the earliest victories of the Peninsular campaign. In its results the battle was indecisive, and the only thing the English gained was the glory of victory.

BARROT, bȧ'rṓ', Camille Hyacinthe Odilon (1791-1873). A French statesman. He was born at Villefort, Lozère, July 19, 1791. In 1814 he became an advocate in the Court of Cassation at Paris, soon acquiring a high reputation as an eloquent pleader, becoming one of the most influential leaders of the Liberal opposition. He was president at this time of the Society Aide-toi (q.v.). After the Revolution of 1830 he was appointed prefect of the Department of Seine, and in Lafayette's ministry a member of the Council of State. In a few months, however, he resigned his office of prefect, and declined the post of Ambassador at Constantinople, offered him by Louis Philippe. After Casimir-Périer became Minister he also lost his place in the Council of State. He now began his career in the Chamber of Deputies as the leader of the so-called 'dynastic opposition,' and became the hope of all who desired the carrying out of the principles of the July Revolution. He essentially contributed to the removal of the Doctrinaires (q.v.) from office, in February, 1836, and energetically opposed the ministry of Molé, even supporting the doctrinaires in accomplishing its overthrow, in 1839. The same year he visited England and Scotland. When, in 1840, Thiers was placed at the head of the Government, Barrot for the first time declared himself in favor of the ministerial policy on the Eastern Question. On the return of Guizot to office, his opposition to the Government was renewed. Taking a conspicuous part in the reform movement of 1847, he attended several of the provincial reform banquets which preceded the Revolution of 1848. On the outbreak of the struggle of February 23, when Louis Philippe called upon Thiers to form a new ministry, Barrot was appointed president. His advice to the King to withdraw his troops proved fatal to the throne of July. In the last sitting of the Chamber of Deputies, Barrot supported the claim of the Comte de Paris to the throne, and the regency of the Duchesse d'Orléans. Under the Presidency of Louis Napoleon he was for some time a minister, and conducted the Government with success till October 31, 1849, when he retired from active political life. He accepted no office under the Second Empire, but took part in the conference in favor of Poland, held at Paris in 1864. In 1872 he was made a Councilor of State and Vice-President of the Council. Consult his *Mémoires posthumes* (Paris, 1875-77).

BAR'ROW. A term applied to several geographical points in honor of the famous traveler, Sir John Barrow (q.v.). The most important of these are Point Barrow, in latitude 71° 23′ N. and longitude 156° 31′ W., marking the northern extremity of America; Barrow Strait, a channel extending from latitude 73° 45′ to 74° 40′ N., with an average breadth of 40 miles (Map: North America, J 2). It is a continuation of Lancaster Sound, connecting Baffin Bay with Melville Sound. It was discovered by Parry in 1819.

BARROW. An important river in the southeast of Ireland (Map: Ireland, E 4). It rises in the Slieve Bloom Mountains, and after a short flow eastward, turns south and continues to flow in the same direction to the Atlantic, where it forms, in conjunction with the Suir (q.v.), the Waterford Harbor. Its entire length is about 120 miles, and it is navigable for 300-ton steamers as far as New Ross, about 25 miles from its mouth. Barges ascend as high as Athy, where the Barrow is connected with the Grand Canal. Its principal tributary is the Nore.

BARROW. An artificial mound of earth or stone, usually erected as a sepulchral monument or tumulus, common in Great Britain. See EUROPE, PEOPLES OF.

BARROW, or BARROWE, HENRY (?-1593). An English Church reformer. He took a B.A. degree at Cambridge in 1570, became a member of Gray's Inn in 1576, was interested by John Greenwood in Church reforms, and influenced by the works of Robert Browne, founder of the Brownists. In 1586, while studying theology, he visited Greenwood in the Clink Prison, and was thereupon seized. He was three times examined by the ecclesiastical authorities, and with Greenwood was imprisoned in the Fleet. In collaboration with Greenwood he wrote several tracts and books. He also published the interesting *Brief Discourse of the False Church* (1590). With Greenwood he was, in 1593, indicted for various alleged offenses, and hanged at Tyburn. By many he has been regarded as one of the founders of Congregationalism. For an exposition of this view, consult H. M. Dexter, *Congregationalism of the Last Three Hundred Years as Seen in Its Literature* (New York, 1880).

BARROW, CAPE. See BARROW.

BARROW, ISAAC (1630-77). An eminent English theologian and mathematician. He was born in London and was educated at the Charterhouse and the University of Cambridge. Although he acquired fame in several distinct lines, it is as a mathematician, perhaps, that he made his greatest success. He was appointed professor of geometry at Gresham College in 1662, and in the following year was made Lucasian professor of geometry at Cambridge. He resigned the latter appointment in 1669 in favor of his pupil, Isaac Newton. In 1672 he became master of Trinity College, and to his efforts is due the foundation of the valuable library of that institution. In 1675 he was nominated vice-chancellor of the university. He died two years later at the age of forty-seven. Of his original mathematical works, the principal are his *Lectiones Geometricæ* (London, 1669) and *Lectiones Opticæ* (Cambridge, 1674). Noteworthy are also his *Euclidis Elementa* (1655); *Archimedis Opera* (1675); and *Apollonii Conicorum lib. iv.* (1675). A Latin edition of his mathematical works, some of which exist also in English translations, was prepared in 1860 by Whewell. The best edition of the *Theological Works* of Barrow, including his Latin poems and a notice of his life by Whewell, has been prepared by the Rev. A. Napier (9 vols., Cambridge, (1859). The Davy Manuscripts in the British Museum contain another excellent biography of Barrow. The mathematical contributions of Barrow paved the way for the introduction of the differential calculus, his treatment of tangents approaching closely the methods of the fluxional calculus of Newton. In another field, his *Treatise on the Pope's Supremacy* (posthumous) is generally recognized as one of the very best works of its kind; and no less celebrated are his sermons.

BARROW, Sir JOHN (1764-1848). An English traveler and writer, born at Ulverston. At an early age he devoted himself to the study of mathematics and astronomy. He visited Greenland with a whaler about 1784, and from 1786-91 taught mathematics at Greenwich. In 1792 he received an appointment as private secretary and keeper of accounts to Lord Macartney, Ambassador to China, and availed himself of this opportunity to learn the Chinese language, and to collect valuable materials afterwards published in part in the *Quarterly Review* and in his *Travels to China* (1804). When Lord Macartney became Governor of Cape Colony, Barrow made extensive excursions in the interior of the country, which he described in his *Travels in the Interior of Southern Africa* (2 vols., 1801-03). He returned to London in 1804, and was appointed by Lord Melville Secretary to the Admiralty, which post he continued to hold till 1845. He published *A Voyage to Cochin-China in the Years 1792 and 1793* (1806); *The Life of Macartney* (2 vols., 1807); *A Chronological History of Voyages into the Arctic Regions* (1818); and a series of lives of English naval officers. Under Peel's Ministry, in 1835, he was raised to a baronetcy. In 1845 he retired from public service. Two years afterwards he published *An Autobiographical Memoir* (1847) and *Sketches of the Royal Society*. More than almost any other Englishman of his time, he promoted Arctic discoveries. His name was given to Barrow Strait, Cape Barrow, and Point Barrow. With him also originated the idea of the Royal Geographical Society, founded in 1830, of which he was vice-president till his death.

BARROW-IN-FURNESS. A seaport and county borough in Lancashire, England, on the southwestern coast of Furness Peninsula, on the Irish Sea (Map: England, C 2). It is 8 miles southwest of Ulverston and 18 miles northwest of Lancaster. Its importance as a great manufacturing centre dates from the discovery in 1840 of rich hematite ore in the neighborhood, and the subsequent establishment of mines and smelting works. The town is built on a rectangular plan. The chief of several fine public buildings is the town hall, and the handsome Gothic Church of Saint George. The municipality maintains a public and branch libraries, a school of science and art; owns its waterworks, gas, and electric light plants, markets, abattoirs and cemetery. There are several fine docks, and among the numerous industrial establishments are foundries, engineering works, extensive ship-building yards, ship-armor and wire works, jute and paper factories. Copper as well as iron ore is obtained in considerable quantities near Barrow. The chief export trade is pig-iron, steel rails, and ore. Its imports include timber from Sweden and Canada, coal from Wales, and preserved provisions from the United States. A large cattle trade is carried on with Belfast. There is regular steam communication with Glasgow and Belfast, and the Isle of Man. The town takes its initial name from Barrow Island, a traditional burial place of Norse rovers, and now the central point of the harbor and the seat of its ship-building industries. The interesting and picturesque ruins of the Twelfth Century Cistercian Abbey of Furness are within 2 miles of the town; and there are ruins of an ancient castle on Piel Island. In 1847, Barrow was a fishing village of 300 inhabitants. The population in 1891 was 51,712; in 1901, 57,584. Consult Richardson, *Furness, Past and Present* (Barrow, 1880).

BARROW, Point. See Barrow.

BAR'ROWS, Elijah Porter (1807-88). An American clergyman, educator, and author, born at Mansfield, Conn. He graduated at Yale in 1826, was ordained in 1832, and from 1835 to 1837 was pastor of the first Free Presbyterian Church in New York City. From 1837 to 1852 he was professor of sacred literature in Western Reserve College, Ohio, and from 1853 to 1866 professor of Hebrew language and literature at the Andover Theological Seminary. He was appointed in 1872 to the chair of Hebrew at Oberlin College, Ohio. The degree of D.D. was conferred upon him in 1858 by Dartmouth College. He contributed extensively to the *Bibliotheca Sacra*, was an editor of the *Bible with Notes* of the American Tract Society, and published a *Companion to the Bible* (1867); *Sacred Geography and Antiquities* (1872); and *Manners and Customs of the Jews* (1884).

BARROWS, John Henry (1847-1902). An American clergyman and educator, born at Medina, Mich. He graduated at Olivet College, Mich., in 1867, studied at Yale, Union, and Andover theological seminaries, and, after holding pastorates at Lawrence, Mass., and East Boston, Mass., was pastor of the First Presbyterian Church of Chicago from 1881 to 1896. He organized and was president of the unique World's Parliament of Religions, held at Chicago, in 1893. In 1896-97 he lectured extensively throughout the Indian Empire. He was Morse Lecturer at the Union Theological Seminary in 1898, and in the same year was elected president of Oberlin College, Ohio. As a pulpit orator and occasional speaker, he was widely and most favorably known. His publications include a work on Christian evidences, *The Gospels Are True Histories* (1890); *I Believe in God* (1891), in exposition of that clause of the Apostles' Creed: a *History of the World's Parliament of Religions* (2 vols., 1893); a *Life of Henry Ward Beecher* (1893); and *The Christian Conquest of Asia* (Morse Lectures, 1899).

BARROWS, Samuel June (1845—). An American author and philanthropist. He was born in New York City, May 26, 1845. After finishing his school days he learned telegraphy and shorthand and became a newspaper reporter. From 1867 to 1869 he was secretary to William H. Seward; in 1870 and 1871, in the bureau of rolls and archives, State Department, Washington; 1871-74, a student in the Harvard Divinity School, Cambridge, Mass., acting also as Boston correspondent of the New York *Tribune*, and in the summer of 1873 he went in this capacity on the Yellowstone Expedition with Generals Stanley and Custer; and in that of 1874 on the Black Hills Expedition. In 1874 and 1875 he was a student in Leipzig; B.D. (Harvard, 1875). In 1876 he became pastor of the First Church (Unitarian), Dorchester, Boston, Mass.; in 1881, editor of *The Christian Register*, Boston; in 1896, commissioner of the United States on the International Prison Committee. He was a member of the Fifty-fifth Congress (1897-99), and represented the House of Representatives at the Interparliamentary Congress on Arbitration at Brussels (1897), Christiania (1899), and Paris (1900). In the autumn of 1900 he became corresponding secretary of the Prison Association of New York. Besides editing the biography of Rev.

Thomas J. Mumford (Boston, 1879), an antiquarian report on the *Records of the First Church, Dorchester, 1634-1736* (1880), the memorial of Ezra Abbot, D.D., LL.D. (Cambridge, 1884), and Theodore Parker's *West Roxbury Sermons, 1837-48* (1892), and writing elaborate reports for the United States Government on penological matters, he has published *The Doom of the Majority of Mankind* (1883); *A Baptist Meeting-House; The Staircase to the Old Faith, the Open Door to the New* (1885); and (with Mrs. Barrows) *The Shaybacks in Camp* (1887); *The Isles and Shrines of Greece* (1898).

BARROW STRAIT. See BARROW.

BARRUNDIA, bär-rōōn'dē-ȧ, JOSÉ FRANCISCO (1779-1854). A Central American statesman, born in Guatemala. He was prominent in the revolt against Spain, and in 1813 was condemned to death for treason, but made his escape. In 1823-24 he was a member of the first Constitutional Convention of Central America, and introduced the measure which effected the abolition of slavery. He was President of Central America in 1829-30, and of the Confederation of Honduras, Nicaragua, and Salvador in 1851-52. In 1854 he came to the United States as envoy from Honduras, with the purpose of negotiating for the annexation of that State to the American Republic, but died before anything had been accomplished.

BAR'RY. A seaport town and railway terminus in Glamorganshire, Wales, 7 miles southwest of Cardiff (Map: Wales, C 5). It has fine docks and a tidal basin covering 90 acres between the mainland and Barry Island, and carries on an export trade in coal, and iron and its manufactures. The municipality is particularly progressive; it owns gas and water-works, abattoirs, cemeteries, and maintains public schools, a public library, and reading-rooms, garden allotments, parks, several hospitals, and a sanatorium. It initiated the prohibition of unlicensed houses for lodging seamen, and instituted a system of licensed houses. Population, in 1891, 13,300; in 1901, 27,000.

BARRY (Fr. *barré*, p.p. of *barrer*, to bar). In heraldry, the term applied to a shield which is divided transversely into four, six, or more equal parts. *Barry-bendy* is where the shield is both barred and bended, so as to present a lozenged surface. *Barry-pily* is where the shield is divided by bars and diagonal lines, so as to show piles or wedge-shaped figures.

BARRY, ALFRED (1826—). An English bishop. He was born in London, and was educated at King's College, London, and at Trinity College, Cambridge. He was head-master of the grammar school at Leeds from 1854 to 1862, and became principal of Cheltenham College in 1862, and of King's College, London, in 1868. He was appointed examining chaplain to the Bishop of Bath and Wells in 1869, became canon of Worcester in 1871, chaplain in ordinary to the Queen in 1877, and canon of Westminster in 1881. From 1884 to 1889 he was primate of Australia, metropolitan of New South Wales, and bishop of Sydney. He resigned his see in 1889, and returned to England, where he was made canon of Windsor in 1891, and assistant to the Bishop of London in 1897. His numerous publications include: *Introduction to the Old Testament* (1850); *Boyle Lectures, 1876, 1877, 1878; Christianity and Socialism* (1891); *England's Mission to India* (1894).

BARRY, Sir CHARLES (1795-1860). An English architect. He was born at Westminster, May 23, 1795. Educated at private schools in Leicestershire and Bedfordshire, he was indentured to a firm of architects at Lambeth. At the age of 22, he went to Italy. A wealthy compatriot, attracted by the beauty of his drawings, took him, in 1818, to Egypt. He also visited Greece and Palestine. On his return to England in 1820, he designed a church at Brighton, the Sussex County Hospital, and the Manchester Athenæum, a building in the Grecian style, and built King Edward's Grammar School at Birmingham, the latter esteemed the most beautiful of his works. In London, he designed the very successful Traveler's Club (1832) and the Reform Club (1837), both in Pall Mall, and the College of Surgeons, Lincoln's Inn Fields. After the burning of the old Houses of Parliament in 1834, on a public competition, Barry's design for the new building was adjudged the best (1836). The work was commenced in 1840, and on February 3, 1852, Queen Victoria opened the Victoria Tower and Royal Gallery in state, and on the occasion knighted the architect. Chosen a Royal Academician in 1844, Sir Charles was also a Fellow of the Royal Society, of the Society of Arts, and of the Institute of British Architects.

BARRY, bȧ'rē', COMTESSE DU. See DU BARRY.

BAR'RY, EDWARD MIDDLETON (1830-80). An English architect, the son and pupil of Sir Charles Barry, whom he succeeded as architect of the Houses of Parliament. He built the new Covent Garden Theatre, the new opera house in Malta, the Charing Cross and Star and Garter hotels, and the New National Gallery in London.

BARRY, ELIZABETH (1658-1713). A famous English actress, whose dramatic powers seem to have been latent until awakened by her lover, the Earl of Rochester. Though she was more than once dismissed as unfit for the stage, he wagered, so the story goes, that in six months he would make her a first-rate actress. When, after his tuition, she at length appeared at Dorset Garden as the Queen of Hungary in *Mustapha* (1673?), her success justified his prediction. She came to be considered the greatest actress of her time, and created, it is said, 112 different rôles. As Monimia, which she played to Betterton's Castalio in *The Orphan*, and as Belvidera in *Venice Preserved*, she was perhaps most celebrated, and delighted the heart of their author, Otway, who was devoted to her. Among her other tragic parts were Isabella, in Southerne's *Fatal Marriage;* Zara, in Congreve's *Mourning Bride;* Cassandra, in Dryden's *Cleomenes;* and Calista, in *The Fair Penitent.* She succeeded also in comedy, and created the character of Lady Brute, in the *Provoked Wife* of Vanbrugh. Her power of exhibiting every emotion was extraordinary. The utterance of her phrase, "Ah, poor Castalio!" in *The Orphan,* was particularly famous for being always accompanied by her own tears, as well as those of the audience. She is stated, on the authority of Cibber (*Apology*, ch. v.), to have been the first actress to receive a 'benefit,' which in her case was by royal command. She became wealthy, and retired from the stage to the village of Acton some three years before she died. Consult: Genest, *History of the English Stage*

(Bath, 1832); Cibber, *Apology*, ed. Bellchambers (London, 1822); Doran. *Annals of the Stage*, ed Lowe (London, 1888); Baker, *English Actors from Shakespeare to Macready* (New York, 1879); and Galt, *Lives of the Players* (London, 1831).

BARRY, James (1741-1806). An Irish painter. He was born at Cork, October 11, 1741, the son of a sea captain and inn-keeper. It is said that in his youth he decorated his father's house with reproductions of Raphael's cartoons. A picture, "The Conversion of the King of Cashel by Saint Patrick," exhibited at Dublin, attracted the notice of Burke, who brought the painter to London and presently sent him to study in Paris and Rome. He returned to London in 1770, and exhibited his works with success. He was a man of high ideals, and a hard worker, ready to sacrifice his comfort for his art. His masterpiece is the series of six pictures, representing "Human Culture," painted upon the walls of the Great Room of the Society of Arts at the Adelphi; and this work he did without charge, though he had to engrave for printsellers at night in order to buy food. But with this loftiness of spirit went a hot temper, which embroiled him constantly with other artists. He was elected to the Royal Academy in 1773, and in 1782 was appointed professor of painting to the Academy. In his lectures, he severely criticised other academicians, so that in 1799 he was deprived of his chair and expelled from the institution. During the remainder of his life he was very poor. His friends, among whom were many of the celebrated men of the time, bought Barry an annuity of £120, but he did not live to receive the first payment. He died February 22, 1806, of pleuritic fever; his body lay in state in the Society of Arts and was buried in Saint Paul's.

Barry was a writer as well as a painter. His letters and works on art were collected and published with a memoir (London, 1809). As a painter his technique was faulty, but his conceptions were of a lofty character. His best-known works are "The Victors of Olympia" (one of the decorations in the Society of Arts); "Philoctetes in the Isle of Lemnos"; "Adam and Eve" (in the South Kensington Museum); "Death of General Wolfe" (curious because the painter represented all the figures as nude); and "Venus Rising from the Sea." Consult: Colvin, "James Barry," *The Portfolio* (London, 1873); Wilmot-Buxton, *English and American Painters* (New York, 1883); Cunningham's *Lives of the Most Eminent British Painters, Sculptors, and Architects* (London, 1829-33).

BARRY, John (1745-1803). An American naval officer. He was born in Ireland, came to America about 1760, and settling in Philadelphia, acquired wealth as master of a merchant vessel. He was appointed to command the brig *Lexington* in 1776, and captured the tender *Edward*, the first ship ever taken by a commissioned officer of the United States Navy. In 1777 he captured a British war vessel in the Delaware, and in 1778 was given command of the *Raleigh*, which was soon afterwards pursued and driven ashore by a British man-of-war. In 1781, while returning from France in the *Alliance*, he captured two vessels, but was severely wounded. He was the first senior officer, with the rank of commodore, after the reorganization of the navy in 1794.

BARRY, Sir John Wolfe (1836—). An English engineer. He was born in London, and was educated at Trinity College, Glenalmond, and at King's College, London. He was resident engineer during the construction of the bridges over the Thames and the stations at Charing Cross and Cannon Street, and afterwards built the present bridge over the Thames at Blackfriars, the Barry Dock, near Cardiff (the largest in Great Britain), the Tower Bridge, and numerous railroads and other engineering works. During a visit to the Argentine Republic in 1872, he planned the railroad from Buenos Ayres to Rosario. He was subsequently employed as consulting engineer on the underground-railway system of Glasgow, known as the Glasgow Central Railway. His publications include *Railway Appliances* (in the series entitled "Text-books of Science," 1876); *Lectures on Railways and Locomotives* (1882); *The Tower Bridge* (1894).

BARRY, Martin (1802-55). An English physiologist; born at Fratton. Hants. He studied medicine in London, at the University of Edinburgh, and under Tiedemann at Heidelberg. He wrote much on physiological subjects, and especially on animal development and embryology. Until the publication of his papers in the *Philosophical Transactions* of the Royal Society of London in 1840-43, it was not known that spermatozoa actually penetrate the ovum. He also first demonstrated the segmentation of the yolk in mammals. His means being ample, Barry gave his professional services largely to the poor. He acted as house-surgeon to the Edinburgh Royal Maternity Hospital.

BARRY, Spranger (1719-77). A British actor, born in Dublin. He first played at the Theatre Royal in his native city in February, 1744, and remained there two years. On October 4, 1746, he appeared for the first time in London, as Othello at the Drury Lane Theatre, where his gifts were quickly recognized, and it was not long before he and Garrick were playing Macbeth and Hamlet in alternation upon the same stage. But Garrick had control of the house, and in 1750 Barry withdrew to Covent Garden. There he and Mrs. Cibber played Romeo and Juliet, while Garrick and Mrs. Bellamy were appearing in the same piece at Drury Lane, a rivalry continued to the weariness of the town, as expressed in the well-known line, "A plague o' both your houses!" In 1758 Barry planned a new theatre in Dublin, and three years later one in Cork; but as a manager he did not succeed, and he returned to London. For a time he played at the Haymarket, and then, after 1767, under Garrick's management at Drury Lane. He married Mrs. Dancer in 1768, and went with her in 1774 to Covent Garden. Barry won many laurels in Shakespearean tragedy and created a number of parts, among them Mahomet, in Johnson's *Irene* (1749); Young Norval, in Home's *Douglas* (1757); and Evander, in Murphy's *The Grecian Daughter* (1772). Consult: Genest, *History of the English Stage* (Bath, 1832); Doran, *Annals of the Stage*, ed. Lowe (London, 1888); Pollock, in *Actors and Actresses of Great Britain and the United States*, ed. Matthews and Hutton (New York, 1886).

BARRY, Mrs. Spranger (1734-1801), born Ann Street; afterwards successively Mrs. Dancer, Mrs. Barry, and Mrs. Crawford. An English actress. She was born at Bath, but her connection with the stage began probably in York or Portsmouth, her early career as an actress being spent with her first husband, Mr. Dancer. In November, 1758, she appeared as Cordelia with Spranger Barry in *Lear*, at his new theatre in Dublin. After several years there she went with him to London (1767), married him the next year, and played with him until his death. Afterwards she married a Mr. Crawford, and continued upon the stage for about twenty years, playing in London, and, for a time (1781-83), in Dublin. She was a powerful actress, with a voice which at vehement moments made an extraordinary impression. Her acting of Desdemona was considered almost a creation of the part, which up to that time had been little thought of. The list of her notable rôles includes also, besides Cordelia, Monimia, in *The Orphan*, and Lady Randolph, in *Douglas*, in which she is said to have made her last appearance, some three or four years before her death. Consult the authorities referred to in the preceding article.

BARRY, Thomas Henry (1855—). An American soldier, born in New York City. He graduated at the United States Military Academy, served on frontier and on garrison duty in Dakota, Texas, Arizona, and California, and rose to be brigadier-general U.S.V. and lieutenant-colonel U.S.A. From 1898 to 1900 he was adjutant-general of the Eighth Army Corps and the Military Department of the Pacific. In 1900 he was appointed chief of staff of the Division of the Philippines.

BARRY, William Farquhar (1818-79). An American soldier, born in New York City. He graduated in 1838 at the United States Military Academy, assisted Major Ringgold in the organization of the first battery of light artillery in the United States Army, and served (1846-48) in the Mexican War. He also served in the Seminole War from 1852 to 1853; he was on frontier and garrison duty from 1853 to 1861, and in 1858 was a member of the board for the revision of the system of light artillery tactics. He entered the Civil War as major of the Fifth Artillery; from 1861 to 1862, with rank of brigadier-general of volunteers, was chief of artillery of the Army of the Potomac, and in 1863-64 was chief of artillery of the defenses of Washington, D. C. From 1864 to 1866 he was chief of artillery on the staff of General Sherman (Military Division of the Mississippi), and in 1866 was mustered out of the volunteer service as colonel of the Second Artillery and brevet major-general United States Army. From 1866 to 1867 (at the time of the attempted Fenian raids into Canada) he was in command of the northern frontier; and from 1867 to 1877 he was in command of the artillery school for practice at Fort Monroe, Va.; and from 1877 to 1879 of Fort McHenry, Md. With Gen. J. G. Barnard, he published *Reports of the Engineer and Artillery Operations of the Army of the Potomac* (1863).

BARRY, William Taylor (1785-1835). An American politician and jurist. He was born at Lunenburg, Va., graduated at William and Mary College in 1807, and practiced law at Lexington, Ky. Having already served in the State Legislature, he was in 1810 elected to Congress. He fought in the War of 1812, entered the Senate in 1815, and in 1816 resigned to accept an appointment as justice of the State Supreme Court. In 1829-33 he was Postmaster-General, and was the first incumbent of the office to sit in the Cabinet. In 1835 he was appointed Minister to Spain, and died on the voyage to that country.

BARRY, William Francis (1849—). An English clergyman and author. He was born in London and educated at Oscott and the English College, Rome. From 1873 to 1877 he was vice-president and professor of philosophy at Birmingham Theological College, and professor of divinity at Oscott, 1877-80. From 1883 he was in charge of the small parish of Dorchester, near Oxford, and devoted his time largely to literary work. Besides a large number of articles in the leading English reviews on metaphysical and ethical subjects, he is the author of several successful novels: *The New Antigone*, a powerful study of modern views in regard to marriage (1887); *The Place of Dreams* (1894); *The Two Standards* (1898); *Arden Massiter* (1900); and *The Wizard's Knot* (1901).

BARRY CORN'WALL. See Procter, Bryan Waller.

BARRY LYNDON, lĭn'dọn. The title of one of Thackeray's lesser novels. It appeared serially in *Fraser* (1844), and narrates the career of an Irish adventurer.

BAR'RYMORE, Maurice (1847—). An actor and playwright, named Herbert Blythe. He was born in India and educated at Cambridge, England; but, having gone upon the stage, came to America to appear, early in 1875, and has since been most of the time in this country, where he has played with many of the best-known actors. He was married in 1876 to Georgiana Drew, daughter of Mrs. John Drew. His first season here was at the Boston Theatre, in *The Shaughraun*. In 1882 he became leading man for Mme. Modjeska; in 1887, for Mrs. Langtry; in 1893, for Mrs. Bernard Beere; and the following season for Olga Nethersole. He is the author of *Nadjeska*, which was produced by Mme. Modjeska in 1884, and of other plays. Consult Coward, in *Famous American Actors of To-day*, ed. McKay and Wingate (New York, 1896).

BAR SHOT. A double-headed shot, in shape like a dumb-bell, consisting of a bar, with a half ball or round head at each end. Bar shot were formerly employed in naval warfare for the purpose of destroying masts and rigging.

BARSU'MA, or **BARSUMAS I.** (?—c.489). A Nestorian, who became Bishop of Nisibis and Metropolitan, 435. He induced the King of Persia to expel the Christians who followed the Greek fathers, and to put Nestorians in their place (462). He founded the theological school at Nisibis, which sent missionaries to various countries. He married a nun (Mammæa), and maintained the right of all priests to marry. In Persia the Nestorians venerate him as the founder of their faith.

BAR-SUR-AUBE, bär'sụ'rôb' (Fr., Bar on the Aube). A town in the Department of Aube, France, on the right bank of the river of that name, 30 miles east of Troyes (Map: France, L

3). It is an ill-built, ancient town, numerous old coins and urns attesting that the Romans must have had a station here. Bar-sur-Aube was destroyed by the Huns in the Fifth Century, but was rebuilt soon after, when it became a place of commercial importance. A chapel on the bridge which crosses the Aube marks the spot from which the Bastard of Bourbon was hurled into the river by command of Charles VII. in 1441. Bar-sur-Aube is noteworthy as the place where the council of the allied sovereigns, which decided the plan of the campaign ending in the first fall of the Empire, was held on February 25, 1814; and where, two days after, the French were defeated by the Allies under the chief command of Schwarzenberg. A good trade in wine, wood, hemp, corn, and wool is carried on. Population, in 1896, 4548.

BAR-SUR-SEINE, sän′ (Fr., Bar on the Seine). An ancient town of France, in the Department of Aube, pleasantly situated on the left bank of the Seine, 19 miles southeast of Troyes (Map: France, L 3). It was an important town in the Middle Ages. Population, in 1896, 3157.

BARTAS, bär′tä′, GUILLAUME DE SALLUSTE DU (1544-90). A French Huguenot poet, diplomat, and soldier. He was born at Montfort, and died from wounds received in the battle at Ivry. His *La création* (1578), a religious poem, was widely esteemed, passing through thirty editions in six years. He wrote also *Judith Urania*, *La second semaine de la création*, parts of which, as of the first *Création*, were translated by King James VI., Thomas Hudson, William Lisle, and Thomas Winter. Joshua Sylvester's version of the *Création* (1598) was once very widely read in both England and America. The original has lines of fine inspiration emerging from a maze of dreary absurdity.

BARTENSTEIN, bär′-ten-stīn. A town of East Prussia, situated on the Alle, 35 miles south of Königsberg. It is a manufacturing town of considerable importance, and noted chiefly as the place where the Bartenstein Treaty was concluded between the Prussians and the Russians on April 26, 1807. Population, in 1900, 6779.

BARTENSTEIN, bär′ten-stīn, JOHANN CHRISTOPH, Baron (1689-1767). An Austrian statesman, born at Strassburg. In 1727 he became Secretary of State under the Emperor Charles VI. He retained this position under Maria Theresa until Kaunitz was summoned to the Ministry of Foreign Affairs. His efforts to obtain European recognition of the Pragmatic Sanction of Charles VI. proved unsuccessful, and his policy under Maria Theresa led to the humiliating treaties of peace negotiated at Breslau, Dresden, and Aix-la-Chapelle.

BAR′TER (OF. *barater*, *bareter*, to cheat). In commerce and political economy, the exchange of one commodity for another commodity, as contrasted with the sale of commodities for money. Among primitive peoples, barter was doubtless the only method of exchange, and is still pursued in trading with savage peoples. The trade of modern times, with its development of credit, is largely a system of barter in a modified form. This is seen most clearly in the exchanges between nations, where merchandise imports are balanced off against merchandise exports, and differences only liquidated by shipment of coin or bullion. The important difference between this modern barter and that of primitive peoples lies in the fact that money intervenes as a standard by which the commodities are measured, even though little money changes hands.

BARTER IN LAW. Some courts have held that a statute which refers in terms to a sale of goods has no application to a barter of them; while other courts have held the opposite view. A power to an agent, or representative of the owner, to sell property, is construed strictly, and hence the possessor of such a power, it is generally held, cannot barter the property. For most purposes, however, the rules governing sales are equally applicable to barter or exchange transactions. Indeed, courts of the highest authority have used barter and sale as interchangeable terms. Consult the authorities referred to under the title SALE.

BARTET, bär′tā′, JEANNE JULIE REGNAULT (1854—). A French actress. She was born at Paris, and studied at the *Conservatoire* (1871-72). She was then engaged at the Vaudeville, and made her début in *L'Arlésienne*. Subsequently she won successes in *Manon Lescaut*, *Les bourgeois de Pontarcy*, *Fromont et Risler*, and notably in the creation of the part of the Countess Zicka in Sardou's *Dora* (1877). Her first appearance at the Théâtre Français was as Mlle. Henderson, in *Daniel Rochat*, and before the end of the same year (1880) she was elected a member of the company. She has since added to her reputation by her work in many well-known plays, among them *Ruy Blas*, *Iphigénie*, *Le roi s'amuse*, *L'Etrangère*, *Dénise*, *La souris*, *Thermidor*, *La paix du ménage*, and *Grosse fortune*. Her acting is highly praised by the critics and she is very popular.

BARTFELD, bärt′fĕlt (Hung. *Bàrtfa*). An ancient town of Hungary, in the County of Sáros, on the Tapola, about 28 miles north of Eperies (Map: Hungary, G 2). Its chief edifices are the fine Thirteenth-Century Gothic Church of Saint Ægidius, and a handsome Rathaus dating from the Fifteenth Century. There is a considerable trade in linen. About 2 miles to the north of the town, in the midst of pine forests, are the celebrated and much-frequented chalybeate springs. Population, in 1890, 5000, mostly Slovaks.

BARTH, bärt. A seaport in Pomerania, Prussia, on the bay of the same name, 17 miles northwest of Stralsund (Map: Prussia, E 1). It has a church dating from the Thirteenth Century. Among its industries are shipbuilding, beer brewing, and fish curing and packing. It also has iron foundries and machine works. Population, in 1890, 5550; in 1900, 7100. It was once the residence of the dukes of Pomerania, and from 1630 to 1815 belonged to Sweden.

BARTH, AUGUSTE (1834—). A French Orientalist. He was born at Strassburg, March 22, 1834. He is best known by his work in connection with the religions of India. His volume, *Les religions de l'Inde* (Paris, 1879), was translated into English (London, 1882). Mention may also be made of his *Inscriptions sanscrites du Cambodge* (Paris, 1885) and of numerous monographs and reviews in *Journal Asiatique*, in *Mélusine*, and in the *Mémoires de la Société de Linguistique*. His annual reports on researches into the history of Indian religions, in *Revue de l'Histoire des Religions* (1880), are especially valuable. He is a member of the French Institute.

BARTH, Heinrich (1824-65). A German explorer and traveler. He was born at Hamburg, and received his education at the University of Berlin. After visiting Italy and Sicily, he embarked, in 1845, at Marseilles, and made excursions into Tunis, Tripoli, and Barca. He afterwards extended his researches into Egypt, Sinai, Palestine, Asia Minor, and Greece, and in 1849 he published, at Berlin, *Wanderungen durch die Küstenländer des Mittelmeeres.* Late in that year he and Dr. Overweg again sailed from Marseilles as the scientific companions of James Richardson, intrusted by the British Government with a political and commercial mission to Central Africa. Starting from Tripoli, the travelers crossed the Great Desert with much difficulty and danger. In January, 1851, they separated, and Dr. Barth pursued his researches, for the most part, by himself. In March of the same year, Richardson, and in September, 1852, Overweg, having succumbed to the climate, Barth thenceforward was entirely alone. He, however, continued his explorations, which, when he returned to Tripoli in September, 1855, had extended over 24° of latitude and 20° of longitude, from Tripoli in the north to Adamawa in the south, and from Baghirmi in the east to Timbuktu in the west—upward of 12,000 miles. The range of his investigations and the scientific manner in which he pursued them placed him in the front rank of African explorers. The result of his researches was given in his *Reisen und Entdeckungen in Nord- und Zentralafrika* (5 vols., 1857-58). Afterwards, he made several journeys in Greece, Turkey, Asia Minor, and other countries on the Mediterranean. He also published accounts of these travels, as well as works on the dialects of Central Africa.

BARTH, bärt, *Fr. pron.* bär, or **BART**, Jean (1651-1702). A French naval hero. He was born at Dunkirk, and at an early age entered the Dutch Navy, but on the outbreak of war between France and Holland, he passed over to the French service. As persons not of noble birth could not then obtain the rank of officer in the navy, he became captain of a privateer. In this capacity he displayed astonishing bravery, so that Louis XIV. dispatched him on a special mission to the Mediterranean. He became a terror to the Dutch Navy and a serious menace to the commerce of Holland. On one occasion, with six vessels, he broke through a blockading fleet, shattered a number of the enemy's ships, and convoyed a transport of grain safely into Dunkirk Harbor. His exploits overcame the disadvantages of his birth, and he was made lieutenant and soon after captain in the regular navy. In an action against a superior English force he was taken prisoner, and carried to Plymouth, from which he made his escape in an open fishing-boat to France. His career continued to be a succession of dare-devil exploits carried out with consummate coolness. He cost the English and the Dutch merchants many millions, and their navies many ships. He was later ennobled by the King, but always remained the same gruff, common sailor. Consult: Badin, *Jean Bart* (Paris, 1867); Landelle, *Jean Bart et son fils* (Paris, 1874).

BARTH, bärt, Karl Heinrich (1847—). A German musician. He was born at Pillau, Prussia, and was a pupil of von Bülow, Brousart, and Tausig. He was long a member of the well-known trio, Barth, de Ahna, and Hausmann, whose chamber-music recitals were widely celebrated.

BARTH, Paul (1858—). A German sociological writer. He was born at Baruthe in Silesia, August 1, 1858. He is editor of the *Vierteljahrsschrift für wissenschaftliche Philosophie*, and a professor (ausserordentlich) in the University of Leipzig. He has written on philosophical subjects, but his *Philosophie der Geschichte als Sociologie*, the first volume of which appeared in 1897, is the best historical sketch of the development of sociological theory which has been published in Germany. Among Dr. Barth's other writings should be mentioned: *Geschichtsphilosophie Hegels und die Hegelianer bis auf Marx und Hartmann* (1890); *Tiberius Gracchus* (2d ed., 1893); *Beweggründen des sittlichen Handelns* (1889).

BARTHEL, bär'tel, Melchior (1625-72). A German sculptor. He was born at Dresden, and studied with his father and with Johann Boehme, of Schneeberg (1640-45), and settled at Dresden, where he was appointed sculptor to the court. His principal works are the colossal tomb of the Doge Giovanni Pesaro (Santa Maria dei Frari, Venice); the statue of John the Baptist (Oratory of Santa Maria, Nazareth); and a tomb in San Giovanni e Paolo, Venice. His numerous ivory carvings in the Green Vault at Dresden are considered superior to his more elaborate works.

BARTHÉLEMY, bär'tâ'l'-mē', Antoine. See Proust, Antonin.

BARTHÉLEMY, Auguste Marseille (1796-1867). A French poet and politician. He was born at Marseilles, studied in the Jesuit College of Juilly, and came to Paris with some reputation as a poet after the Restoration. He speedily acquired fame as a satirist, and his light but stinging verse made all Paris laugh and many statesmen wince. Especially the ministers of Charles X. were his prey, and satirical epics named after them, *Les Sidiennes*, *La Villéliade*, *La Corbiéréide*, *La Peyronnéide*, followed each other in close succession. Imprisoned for expressing Napoleonic sentiments, he was liberated by the Revolution of July, and turned at once to the support of Louis Philippe. With time his popularity waned, but he continued to pour out an endless stream of brilliant verse to the day almost of his death. His fine talents, however, were too often at the disposal of the highest bidder; and he sang Napoleon III. as he did the Revolution of 1830. Of his serious work, *L'Insurrection* and *Napoléon en Egypte*, deserve mention.

BARTHÉLEMY, François, Marquis de (1747-1830). A French statesman. He was born at Aubagne, in the Department of Bouches-du-Rhône, and after serving in the bureau of foreign affairs under the Duc de Choiseul, acted as secretary of legation in Switzerland, Sweden, and England. The reputation he gained as negotiator of the treaties of Basel (q.v.) led to his being chosen one of the five directors in 1797. But his royalistic sympathies and his connection with the Clichians (a club of reactionaries) brought about his downfall on the 18th Fructidor (September 4, 1797) and his transportation to Guiana. He escaped from there, returned to France after the 18th Brumaire (November 9, 1799), and was made a Senator by Napoleon, whom Barthélemy sedulously fawned upon till 1814, and then expeditiously deserted in time. Louis XVIII. made him a minister of state and a marquis. In 1819 he proposed the restriction of the electoral franchise, a measure which was carried the following year. Barthélemy was a man of considerable ability and slight political integrity. Consult Kaulek, *Papiers de Barthélemy* (Paris, 1887).

BARTHÉLEMY, JEAN JACQUES (1716-95). A French Orientalist and antiquarian, born at Cassis and remembered for his *Voyage du jeune Anacharsis* (1788), on which he labored thirty years. The voyage, or journey, of the Scythian Anacharsis involves an account of the customs, government, and antiquities of Greece, as they might have appeared to a classical traveler. The experiences of the youth are supplemented by dissertations on literature, music, economy, etc. The learning is not profound, but it is wide; the character of the supposed narrator is well sustained, and though now superseded, the work was immediately and immensely popular. It brought its author a seat in the Academy, and such general regard that, though arrested during the Reign of Terror, he was immediately released by the Committee of Public Safety. He died in Paris, April 30, 1795. A modern attempt to imitate the *Anacharsis*, which was translated into English (1791) and many other languages, is the *Charicles* of Becker, which has greater learning, but less charm.

BARTHÉLEMY SAINT-HILAIRE, bär'tā'l'-mā' săN' tē'lâr', JULES (1805-95). A French scholar and statesman, best known for his commentaries and translations of Aristotle (1837-70). He was born in Paris, and in early life took an active part in radical political journalism, but became in 1838 professor of Greek and Latin philosophy in the Collège de France. He took office during the Revolution of February, 1848, but retired for a time from public and professorial life after the coup d'état of December 2. He was reconciled later to the Empire and resumed his professorship in 1862. From 1871 he was again active in politics,—as deputy, senator for life (1876), and Minister of Foreign Affairs (1880-81). He died in Paris. His chief works, beside the Aristotelian translations and essays, are *De l'école d'Alexandrie* (1845); *Rapport sur le concours ouvert pour la comparaison de la philosophie morale et politique de Platon et d'Aristote, avec les doctrines des plus grands philosophes modernes* (1854); *Sur les Védas* (1854); *Du Bouddhisme* (1855); *Mahomet et le Coran* (1867); *La philosophie dans ses rapports avec les sciences et la religion* (1889); and *Etude sur François Bacon* (1890).

BARTHEZ, bär'tâs', PAUL JOSEPH (1734-1806). A celebrated French physician. He studied medicine at Montpellier, became professor in the university in 1761, and acquired European renown as a practitioner and lecturer. In his principal work, *Nouveaux éléments de la science de l'homme* (1778), he set forth a new theory of life. According to this, there is in the living organism a *vital principle*, which should be distinguished, on the one hand, from the conscious and thinking mind; on the other, from the physical forces producing material transformations in the body. The life of each separate organ is but a *modus*, a particular manifestation of the 'vital principle,' and should not be regarded as a component part of the latter. Barthez was a keen thinker; he produced no experimental facts that might render his hypothesis immediately valuable to the biologist; yet his enlightened views had the effect of imparting a new and powerful impulse to the progress of science.

BARTHOLD, bär'tōlt, FRIEDRICH WILHELM (1799-1858). A German historian, born at Berlin. He studied theology and history at the universities of Berlin and Breslau, and was appointed professor of history at Greifswald in 1831. His principal productions are the following: *Geschichte von Rügen und Pommern* (5 vols., 1839-45); *Geschichte der deutschen Städte und des deutschen Bürgertums* (4 vols., 1850-52); *Geschichte der deutschen Hansa* (3 vols., 1854); *Geschichte des grossen deutschen Kriegs vom Tode Gustav Adolf's ab* (1841-43).

BARTHOLDI, bär'tōl'dē', FRÉDÉRIC AUGUSTE (1834-1904). A French sculptor. He was born at Colmar, Alsace, and at first studied painting under Ary Scheffer, but soon abandoned it for sculpture, and produced a number of statues, allegorical groups, and monuments in bronze and in marble. Among them the best known are the colossal figure of "Liberty Enlightening the World," presented by France to the United States, a colossal group presented by France to Switzerland, the Lafayette Statue in New York, the equestrian statue of Vercingetorix in Paris, and the "Lion of Belfort," which is generally considered his masterpiece. Bartholdi was decorated with the cross of the Legion of Honor in 1865. See LIBERTY, STATUE OF.

BARTHOLDY, bär-tōl'dē, JAKOB SALOMON (1779-1825). A Prussian diplomat. He was born in Berlin, of Jewish parentage, and was educated at the University of Halle. He fought in the Austrian Army against Napoleon, and afterwards entered the diplomatic service of Prussia, and accompanied the allied armies to Paris in 1814, whence he was dispatched to Rome in the following year as Prussian consul-general. He was a great patron of the arts. The revival of fresco painting was due largely to his influence and example. His valuable collection of antiques was bought for the Berlin Museum of Art, while the frescoes of his mansion at Rome, the so-called *Casa Zuccari*, were transferred in 1887 to the Berlin National Gallery.

BARTHOLIN, bär'tō-lēn. A family of Danish scholars of whom the first to win distinction was KASPAR (1585-1629). He was successively professor of rhetoric, medicine, and theology at the University of Copenhagen, and published, in 1611, *Institutiones Anatomicae*, a text-book of anatomy used throughout Europe in the Seventeenth Century in German, English, French, and other translations. Of his sons, JAKOB (1623-53) was a distinguished Orientalist, and THOMAS (1616-80), a noted physician, naturalist, and philologist, who revised his father's *Anatomy* (1641), and was a warm defender of Harvey's doctrine of the circulation of the blood. Thomas had two sons, KASPAR (1654-1704), a distinguished anatomist, and THOMAS (1659-90), an antiquarian, author of *Antiquitatum Danicarum Libri Tres* (1689), a standard work.

BARTHOLIN'S GLANDS (named after Kaspar Bartholin, who discovered them). Two small, round, or oval bodies situated one on either side of the vagina. They are of the racemose types (see GLAND), and are the homologues of Cowper's glands in the male. They consist of acini collected in rather small groups. The cells lining the acini are clear mucous epithelium.

BARTHOLO, bär′tô′lō′. A fussy old guardian in Beaumarchais's *Le Barbier de Séville*. He is a physician, in love with his ward, Rosine, and learning of the suit of Alma Viva, which Rosine enthusiastically favors, determines he will marry her at once. All but succeeding, he is at length outwitted by the clever Figaro, and the Count bears off the prize.

BARTHOLOMAE, bär-tō′lô-mâ, CHRISTIAN (1855—). A German philologist and Iranian scholar. He was born at Bayreuth, June 21, 1855. After graduating from the Bayreuth Gymnasium in 1872, he studied classical philology and general philosophy at the universities of Munich, Leipzig, and Erlangen. He returned to Leipzig in 1874 to devote himself to comparative philology and Oriental studies. In 1879 he went to Halle as a member of the faculty, and thence to an extra professorship at Münster, in Westphalia, in 1885. In 1898 he accepted a call to the professorial chair of Sanskrit and Indo-Germanic philology at Giessen. Among his numerous and important contributions in the field of Aryan linguistics may be mentioned: *Das altiranische Verbum* (Munich, 1878), *Handbuch der altiranischen Dialekte* (Leipzig, 1883); *Arische Forschungen*, 3 vols. (Halle, 1882-87); *Indogermanische Studien* (Halle, 1890-91); two important articles in Geiger and Kuhn's *Grundriss der iranischen Philologie* (Strassburg, 1895-96); and an etymological dictionary of Avestan and Old Persian, *Altiranisches Wörterbuch* (Strassburg, 1902).

BARTHOLOMÆUS ANGLICUS, ăn̲′glĭ-kŭs (Lat. *Anglicus*, English). An English scholar of the Thirteenth Century, erroneously styled DE GLANVILLE, author of the great mediæval encyclopædia, *De Proprietatibus Rerum*, "On the Nature of Things." He studied and taught theology at Paris, and about 1230 entered the Minorite Order. His work was a source of common information on natural history, and was translated into French in 1372, English in 1398, and Spanish and Dutch in the Fifteenth Century, and often printed. Consult *Histoire littéraire de la France*, Vol. XXX. (Paris, 1888).

BARTHOL′OMEW, EDWARD SHEFFIELD (1822-58). An American sculptor. He was born in Connecticut; was first a dentist, then a painter, and lastly a sculptor. He studied art in New York, but with the exception of two visits to this country, his after-life was spent in Italy. Among his productions are "Youth and Age," "The Shepherd Boy," "Ganymede and the Eagle," "Eve After the Fall," and a monument to Charles Carroll. Many of his works are in the Wadsworth Gallery at Hartford.

BARTHOLOMEW, SAINT (Gk. Βαρθολομαῖος, *Bartholomaios*, from Heb. *bar*, son + *Tolmai*). One of the Twelve Apostles, generally identified with the Nathanael of the Fourth Gospel, on the ground that otherwise he would be the only disciple mentioned in the opening chapter of the latter Gospel who did not become an apostle; while the close relationship shown in that chapter to have existed between him and Philip would agree with the coupling of his name with Philip's in the lists of the Synoptists, by whom Nathanael is never mentioned, as Bartholomew is not by the Fourth Gospel. Bartholomew is thus quite likely to have been a distinguishing name (son of Tolmai) added to Nathanael, as Barjona (son of Jona) was to Simon. The traditions which assign him as a missionary to many countries, and make him to have suffered many martyrdoms, are worthless. This disposes of the legend, which Eusebius repeats, that he preached the Gospel in 'India' (properly Arabia), and left behind him there the Gospel of Matthew written in Hebrew—a story which has figured in the discussion of Papias's statement that Matthew wrote his Gospel in that language. (See MATTHEW, GOSPEL OF.) It was on his day in the Roman Calendar, August 24, that the massacre of the Huguenots in Paris took place in 1572.

BARTHOLOMEW'S, MASSACRE OF SAINT (Fr. *La Saint-Barthélemy;* shorter for *La Nuit de Saint-Barthélemy*, the night of Saint Bartholomew). The massacre of the Huguenots, perpetrated on August 24-25, 1572, which grew out of the feud in France between the House of Guise and the Catholics, on the one hand, and the House of Condé and the Huguenots on the other. The long civil strife known as the 'Wars of Religion' had been suspended by the Peace of Saint Germain-en-Laye, and the Queen-regent, Catharine de' Medici, pretended to be intent on the restoration of harmony, which was to be secured by a marriage alliance consummated on August 18, 1572, between young Henry of Navarre, the recognized head of the Huguenot party, and her own daughter, Margaret. Catharine's real policy, however, was to play off one party against the other. She saw with jealousy the growing influence exercised over the King by Coligny, the chief of the Huguenot party; and the attempted assassination of the latter, on August 22, was undoubtedly due to her orders. The wound was not fatal, but the act was accepted by Huguenots and Catholics as the signal that peace was at an end. Both parties assumed a menacing attitude, and Catharine determined to strike first. She secured the reluctant consent of her weak-minded son, Charles IX., in whose name she ruled, and appointed the night of Saint Bartholomew's Day for a general massacre of the Huguenots. From the tower of the royal palace, the signal was given for a carnival of blood, which lasted for several weeks and extended throughout France. The mortality cannot be determined with even approximate accuracy, as the different estimates, varying from 2000 to 100,000, show. Coligny, sought out by Guise himself, was among the first to fall. The two young Huguenot princes, Condé and Henry of Navarre, are said to have ransomed their lives by denying their religion. It is not likely, however, that this would have saved them, had not Catharine perceived that their death would have reacted against her, by demoralizing the party opposed to Guise, and leaving him with unlimited power—a thing she had no intention of permitting. Guise, although he had been the chief instrument in carrying out the plot (having even transgressed in one instance the command of the King in order to execute the work more thoroughly), was unwilling to assume the ignominy attached to it, and Catharine induced her son to acknowledge before the Parlement his sole responsibility for the deed. The real part which the King took is hard to determine. Very reluctant at first to give his consent, he later, it is said, took a fiendish delight in the proceedings; but, on the other hand, some would have it that he died with remorse for the massacre. The weak and wavering character of Charles IX. make it possible that both accounts are true in some degree. But whatever the other factors may have been, Catharine's imperative will and his own natural weakness leave little room for doubt as to the actual responsibility. The Pope solemnly celebrated the event as the deliverance for the Church in France from the machinations of the Huguenots to overthrow the Catholic monarchy and religion. Many Huguenots sought refuge in the mountains of the south and in La Rochelle. That city was besieged by the Duke of Anjou, but upon his receiving the news of his election as King of Poland, he made an agreement, July 6, 1573, by which the King was to grant amnesty to the Huguenots and the right to exercise their religion in certain towns.

For further reference, consult: White, *Massacre of Saint Bartholomew* (London, 1868); Baird, *History of the Rise of the Huguenots of France* (New York, 1879-83); Baumgarten, *Vor der Bartholomäusnacht* (Strassburg, 1882); Martin, *Histoire de France*, Vol. IX. (Paris, 1865).; Duruy, *Histoire de France*, trans. by Carey, Vol. II. (New York, 1889); Duc de Sully, *Memoirs* (London, 1856).

BARTHOLOMEW BAYOU, bi′o͞o. A river or bayou (q.v.) of the United States (Map: Arkansas, D 4). From its source in the southeastern part of Jefferson County, Ark., it flows in a tortuous course southeast, then south, and, crossing into Louisiana, takes a southwesterly direction and empties into the Ouachita River, in Ouachita Parish, La. It is about 275 miles long, and is navigable for 200 miles.

BARTHOLOMEW FAIR. The great annual market, a relic of the mediæval ages, formerly held at West Smithfield, London. It dates from a charter of 1133 granted by Henry I. to his jester, Rahere, who had turned monk and founded the priory of Saint Bartholomew. The fair began annually on Saint Bartholomew's Day (August 24, old style, September 3, new calendar), and lasted fourteen days; but in 1691 was curtailed to four days, and afterwards to three days. Its staple article of commerce was cloth, with the addition of leather, pewter, live stock, and miscellaneous goods. The crowd was attracted by the variety of amusements afforded—in the early days, miracle plays, afterwards secular plays, and at all times mountebanks, etc.—the history of which through succeeding centuries is interesting reading. It gradually degenerated from its original usefulness to a scene and season of riot and dissipation, and as a menace to public morals was abolished in 1855. Consult: Morley, *An Historical Account of Bartholomew Fair* (London, 1810); id. *Memoirs of Bartholomew Fair* (London, 1859).

BARTHOLOMEW'S (Saint) **HOSPITAL,** Smithfield, London. Originally it formed part of the priory of Saint Bartholomew, founded in 1102 by Rahere, the king's minstrel, who was the first prior of the convent of Augustinian Canons, founded by him in Smithfield. At the dissolution of the religious houses, it was founded anew by Henry VIII., and the endowment has been subsequently enlarged from various sources, public and private. The hospital contains 675 beds, and affords relief to 150,000 patients annually. There is a medical school attached, in which about 400 students are gathered; and a convalescent home accommodating 75 patients.

BAR′TIZAN. A small stone closet, thrown out upon corbels over doorways, and on other parts of mediæval castles, generally for defense, but sometimes only for convenience to the inmates and defenders. The word is not used before Scott. It is probably a Scotch corruption of *bratticing* or *bretticing*.

BART′LETT, Elisha (1805-55). An American physician. He was born at Smithfield, R. I., graduated at the medical department of Brown University, was a lecturer on pathological anatomy, and was a professor in Transylvania (Ky.) College, and in the universities of Maryland and New York, and the New York College of Physicians and Surgeons. He wrote an *Essay on the Philosophy of Medical Science* (1844); *Fevers of the United States* (1850); and a volume of poems, entitled *Simple Settings in Verse for Portraits and Pictures in Mr. Dickens's Gallery* (1855). He was also editor of the *Monthly Journal of Medical Literature.*

BARTLETT, Homer Newton (1845-1905). An American composer, organist, and teacher. He was born at Olive, N. Y., December 28, 1845, and was one of the best-known as well as most prolific of modern American musicians, his compositions and arrangements, numbering nearly 200. He exhibited unusual precocity, and in 1861 began his studies with S. B. Mills, Max Braun, Jacobsen, and others. At the same time he commenced his career as a composer, and subsequently held various positions in New York City and vicinity as organist, etc. Among his most popular compositions are a *concert polka* for pianoforte; an organ *toccata;* violin and orchestra *concerto;* tenor song, *L'amour;* and a cantata for chorus and orchestra, *The Last Chieftain.* He was particularly successful in his glees and part-songs for men and women's voices.

BARTLETT, John (1820—). An American editor and publisher; born at Plymouth, Mass. He became senior member of the firm of Little, Brown & Co., Boston, in 1878. He compiled a well-known and valuable collection of quotations from poets and prose-writers, entitled *Bartlett's Familiar Quotations* (1855), which has passed through many editions. He also published in 1894 an exhaustive concordance to Shakespeare.

BARTLETT, John Russell (1805-86). An American bibliographer, lexicographer, and ethnologist. He was born in Providence, R. I.; passed his early life at Kingston, Canada; became a banker in Providence, and later a bookseller in New York, and returned to Providence in 1850. From 1850 to 1854 he served on the commission appointed by President Taylor to fix the boundary between the United States and Mexico, in accordance with the Treaty of Guadaloupe-Hidalgo, and from 1855 to 1872 was Secretary of State for Rhode Island. He was a voluminous writer, among his publications being *The Progress of Ethnology* (1847); *A Dictionary of Americanisms* (1850), which went into many editions, and was long a standard book of reference; *A Personal Narrative of Explorations and Incidents in Texas, New Mexico, Sonora, and Chihuahua* (1854); and *Memoirs of Rhode Island Officers in the War of the Rebellion* (1867). In addition he compiled a number of valuable works, chiefly bibliographical, including *Records of the Colony of Rhode Island and the Providence Plantations*, 10 vols. (1856-65); *Bibliography of Rhode Island* (1864); *Literature of the Rebellion: A Catalogue of Books and Pamphlets Relating to the Civil War and to Slavery* (1867), and a four-volume *Catalogue of the John Carter Brown Library.*

BARTLETT, Josiah (1729-95). An American statesman, born at Amesbury, Mass. After but slight study he began medical practice at Kingston, N. H., in 1750, and in 1754 successfully introduced Peruvian bark in treatment of *angina maligna.* He received from the royal Governor, Sir John Wentworth, appointments as a magistrate and as commander of a militia regiment, but in 1775 was deprived of both in consequence of his Whig activities. A delegate in 1775 and 1776 to the Continental Congress, he was the first member to vote for the Declaration of Independence, and the first, after the President, to sign the document. He became chief-justice of the New Hampshire court of common pleas in 1779, a judge of the State Supreme Court in 1784, and Chief Justice in 1788. From 1790 to 1793 he was President of New Hampshire, and in the latter year, under the new Constitution, was elected Governor. He was the principal founder (1791) of the New Hampshire Medical Society.

BARTLETT, Paul Wayland (1865—). An American sculptor, born at New Haven, Conn. He began the study of sculpture in Boston under Frémiet, and at 14 first exhibited at the Salon. He entered the Ecole des Beaux-Arts, and was a pupil there of Cavalier. He received honorable mention at the Salon in 1887, and was made a member of the Legion of Honor (1895). Among the notable works of this sculptor are the equestrian statue of General McClellan in Philadelphia, the statue of Gen. Joseph Warren in Boston, the equestrian statue of Lafayette, presented by the school children of the United States to France, and now in the square of the Louvre, Paris; statues of Columbus and Michelangelo in the Congressional Library at Washington, and other works in the permanent art collections of Philadelphia, Boston, Chicago, and in the Luxembourg Museum in Paris.

BARTLETT, Samuel Colcord (1817-98). An American clergyman and educator, born at Salisbury, N. H. He graduated at Dartmouth College in 1836 and at Andover Theological Seminary in 1842; was ordained to the ministry in 1843, and from 1843 to 1846 was pastor of the Congregational Church of Monson, Mass. From 1846 until 1852 he was professor of intellectual philosophy at Western Reserve College (Hudson, Ohio); from 1852 to 1857 was pastor of the Franklin Street Congregational Church, Manchester, N. H., and in 1857-58, of the New England Church, Chicago; and from 1858 to 1877 was professor of biblical literature in the Chicago Theological Seminary. He was, from 1877 to 1892, president of Dartmouth College, which, during his administration, was greatly expanded as to curriculum, buildings, and funds. He received the degree of D.D. from Dartmouth, and that of LL.D. from Dartmouth and Princeton. A distinguished biblical scholar, he published, in addition to contributions to the *Bibliotheca Sacra*, the *Princeton Review*, and other periodicals; *Life and Death Eternal* (1866); *From Egypt to Palestine* (1879); *Sources of History in the Pentateuch* (1883); *The Veracity of the Hexateuch* (1897) and other works.

BARTLETT, William Francis (1840-76). An American soldier. He was born at Haverhill, Mass., and studied at Harvard for three years, but left college in 1861 to join the Federal Army. He received a captain's commission in August, served in the battle of Ball's Bluff, and at the siege of Yorktown received a wound which necessitated the amputation of his leg. By the spring of 1862 he had recovered sufficiently to graduate with his class at Harvard. He organized the Forty-ninth Massachusetts Volunteers in September, 1862, and served as colonel in General Banks's Louisiana expedition. He was wounded at Port Hudson, and again in the Wilderness campaign, was taken prisoner at the explosion of the Petersburg mine, was confined for a time in Libby Prison, and after his release was placed in command of the First Division of the Ninth Army Corps. In June, 1864, he was raised to the rank of brigadier-general of volunteers, and in March, 1865, was brevetted major-general of volunteers for 'gallant and meritorious services during the war.' As a soldier he was noted for his intrepidity, coolness, and daring in action. After the war, until the time of his death, he was engaged in business in Richmond, Va., and Pittsfield, Mass. Consult Palfrey, *Memoir of William Francis Bartlett* (Boston, 1878).

BARTLETT, William Henry (1809-54). An English topographical draughtsman. He was born in London, and began his career as an assistant to John Britton, the architect, for whose *Cathedral Antiquities of England* (1814-32) he furnished numerous sketches. A series of volumes, containing more than 1000 of his drawings made during extended travel in Europe and the Orient, were published by Dr. Beattie, his companion on several of these voyages, and others. Between the years 1836 and 1852 Bartlett made four voyages to the United States and Canada, the fruits of which appeared in *American Scenery* (1840), and *Canadian Scenery* (1842), with text by N. P. Willis. Besides his frequent contributions to works of art, he published the well-known books: *Walks About Jerusalem* (1844); *Forty Days in the Desert* (1848); *The Nile Boat: or Glimpses of Egypt* (1849); *Footsteps of Our Lord and His Apostles in Syria, Greece, and Italy* (1851); *The Pilgrim Fathers* (1853); *Jerusalem Revisited* (1855).

BARTLETT, William Holmes Chambers (1809-93). An American soldier and scientist, born in Lancaster County, Pa., and educated at West Point, where he graduated in 1826. As a lieutenant of engineers he served as assistant professor at West Point, from 1827 to 1829, and again from 1834 to 1836 as acting professor of natural and experimental philosophy. From 1828 to 1832 he was engaged in construction work at Fort Monroe, and from 1832 to 1834 was assistant to the chief engineer at Washington, D. C. In 1836 he resigned his lieutenancy in the army, and became full professor of philosophy at West Point, which office he held until he retired from active service in 1871. He was an original member of the National Academy of Sciences. His works include: *Treatise on Optics* (1839); *Synthetical Mechanics* (1850-58); *Acoustics and Optics* (1852-59); *Analytical Mechanics* (1853-59); and *Spherical Astronomy* (1855-58).

BAR′TOL, Cyrus Augustus (1813-1900). A Unitarian minister, born at Freeport, Me. He graduated at Bowdoin College, 1832, and at the Cambridge Divinity School, 1835, and from 1837, for fifty years, was a pastor in Boston. His works include: *Radical Problems* (1872); *The Rising Faith* (1875); and *Principles and Portraits* (1880).

BARTOLI, bär′tô-lē, Adolfo (1833-94). An Italian author, born at Fivizzano. He at first studied law, but afterwards became associate editor of the *Archivio storica italiano* (1856-59), principal of the gymnasium in Alessandria, director of the naval academies at Leghorn, Piacenza, and Venice, and professor at the *Instituto degli studj superiori* at Florence (1874). Besides his valuable editions of the earlier Italian authors, he published several original works, among which may be mentioned: *I viaggi di Marco Polo* (1859); *I primi due secoli della letteratura italiana* (1870-79); *I precursori del Boccaccio* (1876); *Storia della letteratura italiana* (vols. i-viii., 1878-89).

BARTOLI, Daniello (1608-85). A learned Italian Jesuit. He was born at Ferrara, and died at Rome. He was for many years rector of the Jesuit College at Rome, but is best known as author of an *Istoria dell Compagnia di Gesù* ("History of Jesuits"), vols. i.-iii., covering the history of the Order in Africa, China, and other parts of the East, and vols. iv.-v., England and Italy. He also wrote numerous biographies, books on religion and morals, and on physical phenomena, which have been highly commended. He has been sharply criticised, however, and no less an authority than Ruggiero Bonghi has pronounced his historical work "labored, obscure, and unsystematic." His complete works appeared at Turin in 34 volumes (1823-44).

BARTOLINI, bär′tô-lē′nē, Lorenzo (1777-1850). An Italian sculptor. He was born in Saviniana, near Prato, and studied chiefly under Lemot in Paris, where (with a bas-relief of Cleobis and Biton) he obtained a prize at the Institute, which brought him commissions for a relief for the Vendôme Column and a bust of Napoleon for the Institute. In 1808 the Emperor sent him to Carrara to establish there a school of sculpture. After his patron's fall, he was appointed professor of sculpture in the Florentine Academy. Although his work had hitherto been in the classical style of the First Empire, he now sought to reform this by the application of the realistic principles of the fifteenth-century Florentines. Their influence is evident in his later works, which thus form a transition from classicism to modern realism. Among the principal are the statues of "Charity," in the Pitti Palace, Macchiavelli in the Uffizi, and two important tombs in Santa Croce, Florence; "Faith," in the Poldi-Pezzoli Museum, Milan; a colossal statue of Napoleon, now in the United States, and many busts, including those of Denon, Byron, Rossini, Cherubini, and Thiers.

BARTOLOMMEO, bär′tô-lōm-mā′ō, Fra (1475-1517). One of the principal painters of the Florentine Renaissance. The son of a sculptor, he was born near the gate of San Piero Gattolino, whence, before becoming a friar, he was called Baccio (Bartolommeo) della Porta (gate). On the advice of Benedetto da Majano, who discovered his precocious talent, he was placed in the atelier of Cosimo Roselli. There he came into contact with Piero di Cosimo, who, according to Berenson, was his master, and formed his lifelong friendship with Albertinelli. With all the fervor of a pious nature, he embraced the cause of Savonarola; of this devotion the well-known portrait of the reformer, long cherished by the brethren of San Marco, but now in the Academy, bears eloquent testimony. To the same period belongs his fresco of the "Last Judgment" (Santa Maria Nuova), finished by Albertinelli. After Savonarola's death, he renounced painting and in 1500 joined the Dominicans at San Marco. Yielding to the persuasion of his prior, the learned Sante Pagnani, he took up the brush again in 1504, and created the beautiful "Apparition of the Virgin to Saint Bernard" (Florentine Academy). He was much influenced by the works of Leonardo, and by the young Raphael, whom he, in turn, influenced to a still greater degree. On a visit to Venice in 1508 he received the commission for his "Saints Mary Magdalen and Catharine adoring God" (1509, Lucca). From 1509 to 1512, he was again associated with Albertinelli; among their joint works are the "Madonna and Saints" in the Pitti and the "Assumption" in Berlin, but the fine "Marriage of Saint Catharine" in the Louvre is by Bartolommeo alone. On a brief visit to Rome (1514) his art was transformed by the Sistine frescoes of Michelangelo, whose colossal forms he thenceforth imitated. After his return to Florence occurred the well-known episode of his "Saint Sebastian," the nudity of which proved so disturbing to the good brethren of San Marco as to cause its removal; it is now in private possession at Pézenas. Among the most famous of his latest works are a "Saint Mark" (1517, Pitti) and the fine "Madonna della Misericordia" (1515, Lucca). He died October 6, 1517, in his convent at Florence. He was the first to portray with highest excellence that majestic combination of character, form, and strict architectural composition so characteristic of the High Renaissance. He excelled especially in draperies, and was among the first to use the lay figure, which he is said to have invented. As is evident rather in his drawings than in his paintings, he was one of the greatest masters of compostion Italy ever produced. It was chiefly from him that Raphael acquired his wonderful mastery of arrangement. Although the color in his paintings has suffered much through his use of dark shadows, it is rich and delicate, and belongs to the very best achieved by Florentine painters. Consult the biographies of Frantz (Regensburg, 1879), Scott (London, 1881), and Gruyer (Paris, 1886).

BARTOLOZZI, bär′tô-lôt′sē, Francesco (1727-1815). An Italian designer and engraver. He was born at Florence, and studied painting there and engraving with Joseph Wagner at Venice. He spent a short time in Rome also, and in 1764 proceeded to London. The forty years of his life spent in that city were productive of his finest work. He engraved "Clytie" after Carracci, Carlo Dolci's "Mater Dolorosa," and many of the works of Angelica Kauffmann. He also contributed to Boydell's Shakespeare gallery. He was excellent as a line engraver, but still more a master of stippling, his most characteristic method, and of etching. In 1802 Bartolozzi was called to superintend a school of engraving in Lisbon, and he remained in Portugal until his death. Consult Tuer, *Bartolozzi and his Works* (London, 1882).

BAR′TOLUS, Osso, or **BARTOLUS A SAXOFERRATO** (1314-57). A celebrated Italian jurist, professor of civil law in the University of Perugia, and the most famous master of the dialectical school of jurists, the Postglossators, also called after him, the Bartolists. His influence on the progress of legal science was considerable, and he won great reputation by his lectures and writings; among the latter are treatises *On Procedure*, and *On Evidence*, and a *Commentary on the Code of Justinian* (1588-89). His magnificent monument in the Church of San Francesco at Perugia bears simply his name.

BARTON, bär′ton, Andrew (?—1511). A Scottish naval commander, who in 1506 completely cleared the coast of Scotland of the Flemish pirates who had infested it. He is said, on this occasion, to have packed the heads of the slain in three barrels, which he sent to King James in evidence of the effectual manner with which he had executed his task. In 1508 he was sent to the assistance of Denmark in the war with Lübeck, but somewhat later was accused of piracy, and after a desperate naval battle was killed in an encounter with Sir Thomas and Sir Edward Howard, who had been sent out by Henry VIII. to capture him. His ship, *The Lion*, was brought as a trophy to the Thames, and became the second man-of-war in the English Navy; the first vessel of this kind to be constructed having been the *Great Harry* (1504). The defeat of the celebrated mariner is commemorated in the old ballad of "Sir Andrew Barton."

BARTON, Benjamin Smith (1766-1815). An American naturalist. He was born at Lancaster, Pa.; studied at Philadelphia, London, Edinburgh, and Göttingen, and was professor of natural history, botany, and materia medica in Pennsylvania College, now the University of Pennsylvania. Besides many papers in the philosophical and medical journals, he published *Observations on Some Parts of Natural History* (1787); *New Views of the Origin of the Tribes of America* (1797); *Elements of Botany* (1812-14); *Collections Toward a Materia Medica of the United States* (1810); and other medical works.

BARTON, Bernard (1784-1849). An English poet, sometimes called 'the Quaker Poet.' He was born at Carlisle, January 31, 1784. In 1810 he became clerk to a banking house at Woodbridge, where he remained till his death. His first volume of verse, *Metrical Effusions* (1812), brought him into correspondence with Southey. *Poems by an Amateur* (1818), and *Poems* (1820), increased his reputation and gained him the friendship of Lamb. *Napoleon and Other Poems* appeared in 1822, and was followed within five years by several other productions. All the poems of Barton are pervaded by pious sentiment, and some passages display much natural tenderness and religious fervor; but he is, on the whole, rather a fluent, pleasant versifier than a poet. So early as 1824, a reading club founded by him in Woodbridge collected the sum of £1200 and presented it to him. Some years before his death he received, through Sir Robert Peel, a pension of £100. Among his later works are: *Fisher's Juvenile Scrap-book* (1836 ff.); *The Reliquary* (1836); and *Household Verses* (1845). He died February 19, 1849. Consult: Barton, *Poems and Letters*, ed. L. Barton, with a memoir by E. Fitz Gerald (London, 1849); and Lucas, *Bernard Barton and His Friends* (London, 1894).

BARTON, Clara (1830—). An American philanthropist. She was born at Oxford, Mass., was a teacher in early life, and the founder of various free schools in New Jersey. In 1854 she had a clerkship in Washington, but resigned at the beginning of the Civil War and went into hospital service. After the close of the war she originated and carried on, at her own cost, a systematic search for missing soldiers. Going to Europe for her health, she was assistant to the Grand Duchess of Baden in establishing hospitals in the Franco-German War, followed the German Army, and was honored with the Gold Cross of Baden and the Iron Cross of Germany. By her efforts the American Red Cross Society was formed, 1881, and she became its president. In 1883 she was appointed superintendent and steward of the reformatory prison for women at Sherborn, Mass. In 1884 she represented the United States at the Red Cross Conference and at the International Peace Convention, both held in Geneva, Switzerland. She personally superintended relief work among the Armenians in 1896, in the Spanish-American War of 1898, and in the Anglo-Boer War of 1899-1902. She is the author of *History of the Red Cross* (1883), and *History of the Red Cross in Peace and War* (1898).

BARTON, Elizabeth (1506?-34). An English impostor, commonly known as the 'Holy Maid,' or 'Nun of Kent.' She was born, according to her statement, in 1506. About 1525 she was employed as a tavern servant at Aldington, where she developed religious mania after a severe nervous illness. In prolonged trances she "told wondrously things done in other places, whilst she was neither herself present nor yet heard no report thereof." The fame of these revelations spread, and Archbishop Warham sent two monks to examine her. One of these, Edward Bocking, or Bockling, saw in her abnormal faculties an opportunity for increasing the prestige of the Roman Catholic religion. He influenced and instructed her, and by assumed 'prophecies' she deceived persons of all ranks, and men of intellect, including even the Archbishop and Sir Thomas More. In 1527 she became a nun at Canterbury, and in 1532 inveighed against Henry VIII.'s intention to divorce Queen Catherine, predicting his death within a month of his remarriage. This excited the King's wrath, and she lost popular confidence by the non-fulfillment of her prophecy. She was arrested, underwent rigorous examinations, and ultimately confessed that her visions and sayings were "feigned of her own imagination only, to satisfy the minds of those which resorted to her, and to obtain worldly praise." With Bocking and four other priests and friars, she was executed at Tyburn, April 20, 1534.

BARTON, William (1748-1831). An American soldier, born in Rhode Island. On the night of July 9, 1777, he led a small party across Narragansett Bay, eluded three British war vessels, and near Newport captured the English General Prescott. For this act Congress gave him a sword and a colonel's commission.

BARTON, William P. C. (1786-1856). An American botanist. He was born in Pennsylvania, graduated at Princeton in 1805, and received the degree of M.D. from the University of Pennsylvania (1808). He organized the United States naval bureau of medicine and surgery; succeeded his uncle as professor of botany in the University of Pennsylvania; was for several years professor of materia medica and botany in Jefferson Medical College, and at his death was senior surgeon of the Navy. He published *Vegetable Materia Medica of the United States* (1817-25); *Compendium Floræ* (Philadelphia, 1818); *Flora of North America* (1818-24).

BARTON'S BUT'TONS, or **I'RIS OR'NAMENTS.** Exceedingly minute lines engraved on metal by a dividing engine produce a surface reflecting various colors. The process was discovered by John Barton, and buttons and other articles stamped by dies engraved in this manner rival gems in brilliancy, and were at one time extensively worn on the clothes of fashionable people.

BARTOW, bär'tō. A town and the county-seat of Polk County, Fla., 44 miles east of Tampa; on railroads of the Plant system (Map: Florida, G 4). It contains the South Florida Military Institute and the Summerlin Institute. The leading industries are phosphate production and fruit cultivation. Population, in 1890, 1386; in 1900, 1983.

BAR'TRAM, John (1699-1777). The first American botanist of eminence. He was born of Quaker parentage, near Darby, Pa.; received a scant education in country schools; and, though bred a farmer, studied medicine and surgery. While engaged in the cultivation of a small farm, his attention was accidentally turned to the study of plants and flowers, and he thereafter devoted himself so assiduously to botanical investigations as to win an international reputation. He secured an appointment as American botanist to George III., and Linnæus, with whom he corresponded, pronounced him 'the greatest natural botanist in the world.' For the purpose of increasing his collections and extending his botanical studies, he made many expeditions in the various American provinces, and, according to his friend, Peter Collinson, thought little of "riding 50 or 100 miles to see a new plant." For many years he carried on an extensive correspondence with the most eminent of European naturalists, to whom he sent large plant collections in exchange for books, and at his home near Philadelphia he received as his guests many foreigners attracted thither by his reputation for learning and hospitality. In 1728 he established at Kingsessing, on the Schuylkill, the first botanical garden in America. In addition to several papers which he contributed to the *Transactions of the Philosophical Society,* he wrote a small but very interesting book, entitled *Observations on the Inhabitants, Soil, Divers Productions, Animals, etc., Made by John Bartram in His Travels from Pennsylvania to Onondaga, Oswego, and the Lake Ontario* (1751). His *Journal Kept Upon a Journey from Saint Augustine up the Saint Johns* was published in William Stork's *Description of East Florida* (1769). Consult William Darlington, *Memorials of John Bartram and Humphrey Marshall* (Philadelphia, 1849).

BAR'TRAM, William (1739-1823). An American botanist and ornithologist. Son of John Bartram. He was born at Kingsessing, Pa., February 9, 1739, and died there, July 22, 1823. He prepared the most complete list of American birds before Alexander Wilson, and wrote *Travels Through North and South Carolina, Georgia, and East and West Florida* (Philadelphia, 1791). He remained unmarried and lived a solitary life, cultivating rare plants, of which he had an extended knowledge.

BARTSCH, bärtsh, Adam von (1757-1821). An eminent Austrian engraver and writer on art. He was born in Vienna, where he became a member of the Academy of Fine Arts and custodian of the Imperial collection of engravings. He produced 505 plates, partly of his own invention, partly after the original designs of famous masters, but is chiefly remembered as the author of *Le Peintre-graveur* (21 vols., 1866), a critical catalogue of engravings of still undisputed authority.

BARTSCH, Karl Friedrich Adolf Konrad (1832-88). A German philologist. He was born at Sprottau, Silesia, February 25, 1832. From 1858-71 he was professor at Rostock, where he established the first Germanic Seminary in Germany. From 1871 until his death he was head of the department of German and Romance philology at the University of Heidelberg. In 1869 he succeeded Pfeiffer as editor of *Germania.* As a scholar, Bartsch was distinguished by versatility and industry. His attention was divided between Middle High German and Provençal poetry, in both of which he edited numerous texts, accompanied by exhaustive investigations of metre, literary relations, etc. Probably his most important single contribution is his study of the Nibelungenlied (1865), which was followed by several editions of the poem and a translation into modern German (1867). His study of the early literatures of Germany and France enabled him to discover many important connections between the two. Among his many other works may be mentioned introductions to the study of Old French and Provençal; *The Song of Roland* (1874); a translation of Burns (1865), and of Dante's *Divine Comedy* (1867). Bartsch's latest work was the preparation of a catalogue of the Old German MSS. of the University Library in Heidelberg (1886). Bartsch was an original poet as well as a scholar, and in 1874 published a volume of lyrics. While much of his work is now antiquated, he will always be remembered as one of the most brilliant scholars and teachers that Germany has ever possessed. He died on February 19, 1888.

BARTTELOT, bär'tlŏ, Edmund Musgrave (1859-88). An English officer. He served in the Indian Army, and participated in the Afghan campaign, and afterwards received an appointment as major in the Egyptian Army, in which capacity he joined the Stanley Expedition of 1887 for the relief of Emin Pasha. On June

11, 1888, after vainly waiting for the carriers promised by Tippoo Tib, and notwithstanding the sickness and famine in his camp, Barttelot began his journey into the interior. In a mutiny among his followers, within a week of his departure, he was shot by one of his men. The accusation of barbarous cruelty, afterwards brought against him by Stanley, was refuted by Barttelot's brother, Major Walter G. B. Barttelot, in the volume entitled *The Life of Edmund Musgrave Barttelot* (London, 1890).

BARU, bä-ro͞o' (Malay). A fine, woolly substance, found at the base of the leaves of the Saguerus, or Arenga saccharifer, one of the most valuable sago palms of the Indian Archipelago. It is much employed in calking ships, in stuffing cushions, etc. See Gomuti.

BARU. A town in the Province of Leyte, Philippines, situated 31 miles from Tacloban, the capital of the province. Population, 12,322.

BARUCH, bā'rŭk (Heb., the blessed; cf. *Benedict*). The son of Neriah, and member of an illustrious family (cf. Jer. li. 59). He was the person to whom the prophet Jeremiah dictated his oracles (Jer. xxxvi. 4 seq.), and who also recited Jeremiah's prophecies before the people (ib., xxxvi. 10). During the siege of Jerusalem by Nebuchadnezzar, both he and the prophet were by their own countrymen imprisoned on suspicion of aiding the Chaldeans (Jer. xxxvii. 13; xliii. 3; Josephus, Ant. x. 9, 1), but obtained from the conqueror freedom and permission to choose their own residence. Baruch remained for some time in Palestine; but when the people, in spite of Jeremiah's remonstrances, went down to Egypt, the prophet, as well as Baruch, accompanied them (Jer. xliii. 6; Josephus, Ant. x. 9, 6). His subsequent history is unknown.

BARUCH, Apocalypse of. A work distinct from the apocryphal Book of Baruch, which was originally composed in Hebrew, but survives only in a Syriac version of the Sixth Century, made from the Greek translation of the original Hebrew. It was discovered by Ceriani in 1866, in a MS. of the Milan Library. Consisting of 7 sections, it contained 7 revelations made to Baruch, the last 5 after a fast of 7 days in each case. The first revelation refers to the coming destruction of Jerusalem, which is pictured as an accomplished fact in the second. In the third, Jeremiah is commanded to go to Babylon, but Baruch is to remain behind. In the fourth Baruch is promised that he will live to bear testimony against the enemies of Israel. The fifth and sixth contain promises and assurances of a renewed period of glory for Israel, and in the last, the 11 periods of tribulation are predicted and described, which will come before the final rebuilding of Jerusalem can take place and the Messianic period be inaugurated. The theory now current among scholars is that the Apocalypse is the work of several authors living before and after the fall of Jerusalem. All the elements of the book, however, are Jewish, and illustrate the Messianic hopes and attachment to the Law which characterize the pious Jews in the century before and in the one after the appearance of Jesus.

Bibliography. For the Syriac text, see the edition of Ceriani (Milan, 1876-83); ib., photolithographic facsimile (Milan, 1876-83); Charles, *Apocalypse of Baruch* (London, 1896); Drummond, *The Jewish Messiah* (London, 1877); De Faye, *Les apocalypses juives* (Paris, 1892).

BARUCH, Book of. An apocryphal book of the Old Testament, embodied in the Septuagint (i.e. Greek) translation, where it is placed between Jeremiah and Lamentations. While claiming to be the work of Jeremiah's secretary, it is in reality a composition due to several writers, perhaps as many as four, none of whom can be placed earlier than the middle or beginning of the Fourth Century B.C. The latest portions of the book bring us beyond the date of the destruction of Jerusalem.

After an historical introduction (chap. i. 1-14) describing the origin and purpose of the book, there comes a confession of the people's sin, which led to the captivity, and a prayer for the restoration of the people's independence (i. 19—iii. 8). The second section (iii. 9—iv. 4) is in praise of wisdom, which is synonymous with the Divine Law, much in the style of the eighth chapter of Proverbs and the later 'wisdom' literature (e.g. Ecclesiasticus). The book closes (iv. 5—v. 9) with words of consolation to the Exiles. Whether the entire book, or only portions of it, were originally written in Hebrew is a question in regard to which no agreement has been reached among critics; and there are even some scholars who believe that the entire work was originally written in Greek, though it may be added that this is an unlikely view.

Bibliography. For Greek text and versions in modern languages, see the Bibliography under Apocrypha. Consult also: Schürer, *History of the Jewish People in the Times of Jesus Christ*, Vol. II. (translation, Edinburgh, 1890-91); Fritsche, *Commentaries* (Leipzig, 1851); Ewald, *Prophets of the Old Testament*, Vol. III. (Eng. trans., London, 1875-81); Kneucker, *Das Buch Baruch* (Leipzig, 1879).

BA'RUS, Carl Hazard (1856—). An American physicist, born at Cincinnati, Ohio. He studied at the School of Mines of Columbia University and at the University of Würzburg, and in 1880 was appointed to the United States Geological Survey. In 1892 he became professor of meteorology, and in 1893 physicist, of the Smithsonian Institution. He was appointed professor of physics in Brown University in 1895. For the Geological Survey he made researches in physical geology; for the Weather Bureau in atmospheric moisture; and for the Smithsonian Institution in aëronautics. He is a member of the National Academy of Sciences, and was in 1895 one of the committee selected by Congress to determine the electrical standards of the United States. He is a frequent contributor to the *American Journal of Science*, and prepared a report on high-temperature measurement, as submitted to the International Congress of Physicists at the Paris Exposition in 1900. He has published, besides numerous monographs, valuable contributions to the bulletins of the United States Geological Survey, including *The Electrical and Magnetic Properties of the Iron-Carburets* (Washington, 1885); *Subsidence of Fine Solid Particles in Liquids* (Washington, 1886); and *On the Thermo-Electric Measurement of High Temperatures* (Washington, 1888).

BAR'WOOD. See Camwood.

BARY, bä′rē, Heinrich Anton de (1831-88). A German botanist, born at Frankfort-on-the-Main. He studied medicine at several universities and spent some time in private practice at Frankfort, but soon began to devote himself entirely to botany. In 1854 he was appointed docent of botany at Tübingen, and in 1859 he was made full professor of botany at Freiburg. He afterwards filled similar posts at Halle and Strassburg. His published writings include a number of valuable works on algæ and fungi. He was also for many years co-editor of the *Botanische Zeitung.* Among his principal works may be mentioned: *Ueber die Keimung der Lycopodien* (1858); *Prosopanche Burmeisteri, eine neue Hydnoree aus Südamerika* (1868); *Vergleichende Anatomie der Vegetationsorgane der Phanerogamen und Farne* (1877); *Vorlesungen über Bakterien* (1887).

BARYATINSKI, bär′yȧ-tēn′skē, Alexander Ivanovitch, Prince (1815-79). A Russian field-marshal. He was educated with the Crown Prince Alexander (Alexander II.), and after 1835 served in the Caucasus, where his successes against the Caucasian leader, Shamyl, during the campaigns of 1850 and 1851, resulted in his promotion to the rank of lieutenant-general (1852). After the accession of Alexander II. he received chief command of the Army of the Caucasus (1856), and after directing three successful campaigns led the storming of Ghunib (1859), where Shamyl was captured. In recognition of these services, he was appointed field-marshal, but owing to ill-health was compelled to retire soon afterwards.

BARYE, bȧ′rē′, Antoine Louis (1795-1875). A celebrated French sculptor. He was born in Paris, September 24, 1795. He inherited his artistic gift from his father, who was a proficient silversmith from Lyons. He began his practice of art by working with an engraver and a goldsmith. He was conscripted in 1812, and during his service is said to have modeled several relief maps for the Government. He turned his attention to sculpture in 1816, when he studied modeling under Bosio and drawing under Gros. In 1819 he took a second prize at the Ecole des Beaux-Arts, and a little later began devoting himself to the study of animals; and in this branch of sculpture he achieved fame. In the Salon of 1831, Barye exhibited his famous "Tiger Tearing a Crocodile." Sometimes rejected by the jury, and not receiving the recognition by his fellow artists that he believed his due, Barye ceased sending to the Salon, and gave himself finally to the production of bronzes for commerce. By this, through public appreciation, which was not lacking for his work, he raised this industry to the plane of art, and it is through these little masterpieces that he is most widely known. The posthumous exhibition of his drawings at the Beaux-Arts was the talk of Paris for the wonderful accuracy and research displayed in the studies of the anatomy, character, and movements of the various animals which he represented. Some of his work is heroic in size, and ornaments public parks in France. The architect of the Louvre employed him to make four groups for the pavilion on the Place du Carrousel. Barye received many honors—was a member of the Institute, artist at the Jardin des Plantes, and an officer of the Legion of Honor. Some of his bronzes adorn Mount Vernon Place, Baltimore. He died in Paris, June 25, 1875. Consult the works of Alexandre (Paris, 1889), De Kay (New York, 1889), and Ballu (Paris, 1890).

BARY′TA. See Barium.

BARYTON, bȧ′rē′tôɴ′ (It. *viol di bordone*). A bow instrument popular in the Eighteenth Century, but now obsolete. Of the size of a cello, it was really the bass in the viola d'amore family, and resembled the viola da gamba in tone. It had a broad finger-board, with 7 gut strings, and under the neck there were 16 strings of brass wire. These acted 'sympathetically,' or were touched with the point of the thumb.

BAR′YTONE, or **BARITONE** (Gk. *βαρύς*, *barys*, heavy, deep + *τόνος*, *tonos*, tone). That species of the male voice which lies between the bass and the tenor, but is, in quality or tone-character, more like the former. Its compass is G to F sharp, and composers assign to it parts that are characterized by manly vigor, power, and solidity. Barytone further means a singer possessing the barytone voice. Barytone clef, in musical notation, means the now obsolete F clef on the third line.

BARZILLAI, bär-zĭl′lȧ-ī. The Duke of Ormond, in Dryden's satire, *Absalom and Achitophel.* He assisted Charles II. in exile in much the same way that Barzillai helped David after the latter had been expelled by Absalom.

BAS, bäs, or **BATZ.** An island of the Department of Finistère, France, 2½ miles distant from the north coast, in the English Channel. It is about 3 miles long and 2 miles broad; is defended by two forts and four batteries, and has a lighthouse at an elevation of 212 feet. Kernoc Haven affords good anchorage. It is inhabited by fishermen, and contains three villages. Population, in 1896, 1286.

BASALT′ (Lat. *basaltes*, an African word). A volcanic rock of basic composition, characterized by a porphyritic texture, and having generally one or more of the feldspathoid minerals, lime-soda feldspar, nephelite, or leucite, associated with pyroxene or hornblende, and magnetite or ilmenite; frequently also with olivine. According as one or the other of these minerals predominates, the chemical composition varies between wide limits, so that an average for basalt would have little significance. Basalts are distinguished as olivine basalts, nepheline basalts, leucite basalts, or as basalts proper, when containing as essential constituents only lime-soda feldspar and pyroxene or hornblende. The terms *dolerite*, *anamesite*, and *basalt* were used to distinguish basalts of coarse, medium, and fine grains, respectively; but since the introduction of the petrographical microscope has made accurate rock-study possible, these terms have fallen into disuse, and others, describing the intimate texture of the rocks as revealed by microscopic study, have taken their place. In the preliminary study in the field, however, they have still some value for cartographical purposes.

Basalts are in all cases the products of consolidation of molten magmas, and generally of lavas which were poured out at the surface of the earth. In contrast with rhyolites and trachytes, which in their genesis they resemble, basalts, when molten, flow as comparatively thin fluids, which travel rapidly down a slope, and on solidifying ultimately build up mountains which have comparatively gentle slopes. Thus the Hawaiian Islands, which are built up of basalt from the sea-bottom, have, in contrast with the slopes of the American Cordilleran volcanoes, which are generally rhyolite or andesite, exceedingly gentle slopes. Masses of basalt, when solidified at the surface, have, quite generally near the original upper surfaces, a separation by cracks into layers parallel to the surface; whereas at greater depths there is produced a series of columns, generally hexagonal in section, and with their columnar axes perpendicular to the original surface. The upper surfaces of a basalt outflow being curved, the columns generally radiate from some point near the bottom of the mass. As the upper layers of rock have been removed by erosion in all save the most recent extrusions of lava, the platy parting is less commonly observed than is the columnar. The Giant's Causeway, in the north of Ireland, is the best-known example of columnar joints in basalt. In common with most other lavas, basalt exhibits all varieties of cellular and scoriaceous texture, depending upon the quantity of steam the lava had absorbed and upon the opportunities afforded this steam to expand when it reached the surface. (For illustration, see GIANT'S CAUSEWAY.) Very similar rocks to basalt are diabase, melaphyre, and augite porphyrite.

BASAN, bȧ'zäN', PIERRE FRANÇOIS (1723-98). A French engraver and writer on art. He was born in Paris, and studied with Jean Daullé and with his uncle, Etienne Fessard. The most noteworthy of his engravings are: "Jupiter and Antiope," after Allegri (Louvre); "Ecce Homo," after Caravaggio; and "Burgomaster Six," after Rembrandt. He later became established in Paris as a publisher of engravings. About 1250 plates, in 12 volumes, were executed by him or under his direction. His most important literary work is the *Dictionnaire des graveurs anciens et modernes* (1809).

BASANITE, băz'ȧ-nīt. See TOUCHSTONE.

BAS'COM, FLORENCE. An American geologist, daughter of Dr. John Bascom. She was born in Williamstown, Mass. In 1882 she graduated with the degrees of A.B. and B.L. at the University of Wisconsin, from which institution she also received the degree of B.S. in 1884. She continued her studies at the University of Wisconsin, taking her master's degree there, and at Johns Hopkins University, where she received the degree of Ph.D. She became a member of the American Academy for the Advancement of Science and of the Philadelphia Academy of Science, and has been assistant editor of the *American Geologist*.

BASCOM, JOHN (1827—). A distinguished American educator; born at Genoa, N. Y. He graduated at Williams College in 1849, was a tutor there from 1852-53, and graduated at the Andover Theological Seminary in 1855. He was professor of rhetoric at Williams from 1855 to 1874, when he was chosen president of the University of Wisconsin. At Wisconsin, in addition to the presidency, he also held the chair of mental and moral philosophy. He withdrew from the university in 1887 and returned to Williams to accept the chair of political science, which he held until he retired in 1901. Dr. Bascom has been prominent as a speaker and a writer on both religious and secular subjects; but it is for his efficient service as a teacher, and his publications, that he is best known. His works include a textbook of *Political Economy* (1859); *Æsthetics* (1862); *The Principles of Psychology* (1869); *The Philosophy of English Literature* (1874); *Ethics* (1879); *Problems in Philosophy* (1885); *The Growth of Nationality in the United States* (1899); and *God and His Goodness* (1901).

BASCULE BRIDGE. See BRIDGE.

BASE, bās (Fr. and It., from Lat. *basis*, Gk. *βάσις*, *basis*, a stepping, step). In architecture, the foot or lowest part or division of any architectural construction, such as a wall, pier, or column. We speak of base-molding, base-course, base-block, to designate different parts of a base. Its most popular and definite use is to designate the third and lowest member of a column or pier, the other two being the *capital* and the *shaft*. (See COLUMN.) When Egyptian columns had a base, it was merely an unmolded block; the Assyrians went further, and invented a base with torus and scotia moldings. The Mycenæan columns had bases; but of the two great styles that divided the Hellenic world in the historic age, the Doric had no base, while the Ionic developed a very clear type, which was at first extremely rich in Asia Minor (Seventh and Sixth centuries), and became simplified and of a uniform type in the Attic School of the Fifth Century B.C. The Persians used a modified form of the early Ionic base of Asia Minor at Persepolis and Susa, and this mixed form influenced Hellenic, and even Roman, work in the Orient. The Corinthian and Composite orders, and the Roman Doric, used the simple Attic Ionic base, with modifications. This consisted of (1) a fillet; (2) an upper convex molding (torus); (3) a scotia or concave molding between two fillets; (4) a larger convex molding; (5) a plinth or base-block; its total height was normally about half the diameter of the column. The Ionic base continued in early Christian, Byzantine, and Mediæval art, not in the stereotyped form given it by the Romans, but with increasing freedom and richness in treatment and decoration. While Italy retained this tradition throughout the Gothic period, and re-popularized it with the spread of its Renaissance style over Europe, there had been an interval when the Romanesque and Gothic styles of the rest of Europe had developed an unparalleled variety and richness in the designs of Ionic bases, usually with more flare; every combination of moldings and of foliated ornament was tried, especially in France. The grouped piers of the Gothic style gave great scope to original treatment. See ARCHITECTURE.

BASE. In chemistry, a radical which is capable of replacing entirely or in part the hydrogen of an acid, neutralizing its acid properties, and forming a salt. A base may be a metallic oxide, as the oxide of potassium, K_2O; a metallic hydroxide, as the hydroxide of potassium, KOH; ammonia, NH_3, or some allied compound. According as one reacting weight of a base acts with one, two, or more reacting weights of a monobasic acid to form a salt, the base is said to be *mono-acid*, *di-acid*, *tri-acid*, etc. The so-called organic bases, i.e. basic compounds containing carbon as one of their constituent elements, are grouped chiefly into two classes, viz.

the amines and the alkaloids. See AMINES; ALKALOIDS; and ACIDS.

BASE. In heraldry, the lower portion of the shield. There is a dexter base, middle base, and sinister base. The *chief* or principal part of the escutcheon is the top. The shield is always supposed to be on the arm of the wearer, and it is his right and left hands, not those of the spectator, which are kept in view. The *ground* or surface of the shield, on which all the *charges* or figures are depicted, is called the *field*. See HERALDRY.

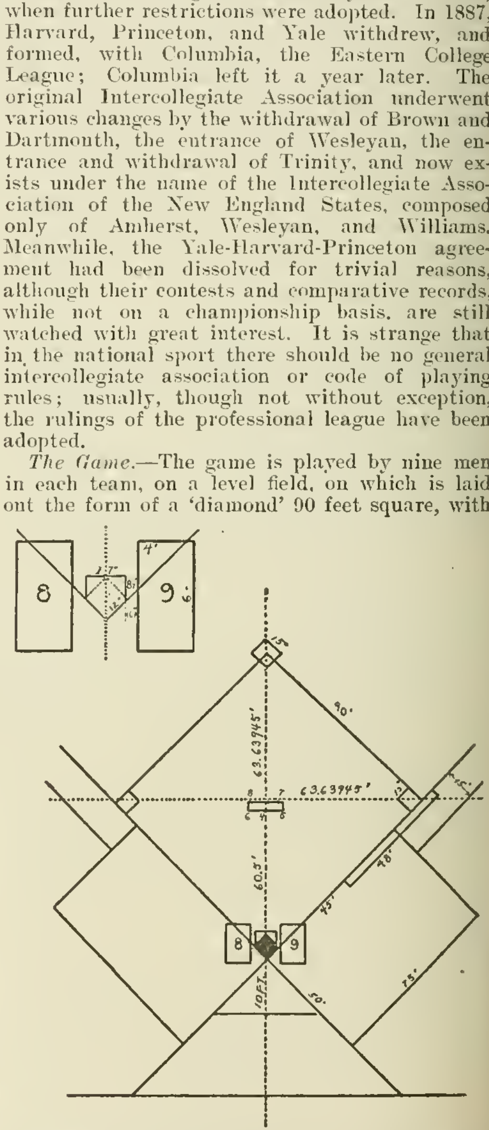
BASE. See BASS.

BASE′BALL′ (named from the 'bases'; see below). An American field-game, which derives its origin from the old schoolboy game of 'rounders.' It has been known in various forms in the Eastern States for nearly a century; but it is only within the past forty years that it has come to be a recognized field game throughout the whole country. The honors of its place of birth are divided. Philadelphia claims that her 'town-ball' was practically 'baseball,' and that it was so played by her Olympic Club from 1833 to 1859. On the other hand, New York claims that her Washington Club, organized in 1843, was the first exponent of the actual game, while certainly the Knickerbocker Club of New York, which played, for convenience, on the Elysian Fields of Jersey City (where now Hoboken stands), was the first to establish a code of rules. Baseball, as a national game, really came into existence with the union of all the clubs of New York and vicinity into a 'National Association of Baseball Players' in 1858.

Professional Baseball.—This association revised the playing rules at its annual conventions from 1858 to 1870, by which time it was found that the popularity of the game had developed, besides the original amateur class, a number of trained professionals. The organization of the first professional baseball nine (the Cincinnati Red Stockings), in 1868, was followed in 1871 by the formation of two national associations, the one governing the amateur clubs, and the other the professionals. In 1876 the 'National League of Professional Baseball Clubs' was organized, the original professional body of 1871 having become extinct. This new association, which is the present existing major league, made good progress in stamping out some of the abuses which, with professionalism, had crept into the game, but new abuses were ever developing. By 1882 the time was ripe for the formation of a rival, and the 'American Association of Professional Clubs' was formed. The two organizations, instead of proving of benefit to the game, created new dangers and discords; so much so that in 1890 the dissatisfied from each combined to form the 'Players' League,' in the hope of getting control of the game.

In the contest of interests which followed, both the Players' and the Association were disbanded, and the National League, under its present name of 'The National League and American Association of Professional Baseball Clubs,' was made the governing body, with 12 clubs (afterwards reduced to 8). Various cities have been represented in this league, Boston and Chicago from the beginning. The champions have been: Chicago, 1876, 1880, 1881, 1882, 1885, 1886; Boston, 1877, 1878, 1883, 1891, 1892, 1893, 1897, 1898; Brooklyn, 1890, 1899, 1900; Providence, 1879, 1884; Detroit, 1887; Baltimore, 1894, 1895, 1896; New York, 1888, 1889; Pittsburg, 1901. By a national agreement made in 1887, the minor leagues—Eastern, New England, Interstate, American (formerly Western), Atlantic, the various State leagues, the International, and Canadian—abide by the one professional code of rules.

The history of college baseball is not a long one. After some ten years of intermittent life among a few New England colleges, it assumed definite shape with the formation, in 1879, of the Intercollegiate Baseball Association by Harvard, Princeton, Brown, Amherst, and Dartmouth. Yale refused to join because professionalism was not barred, coming in the next year, however, when further restrictions were adopted. In 1887, Harvard, Princeton, and Yale withdrew, and formed, with Columbia, the Eastern College League; Columbia left it a year later. The original Intercollegiate Association underwent various changes by the withdrawal of Brown and Dartmouth, the entrance of Wesleyan, the entrance and withdrawal of Trinity, and now exists under the name of the Intercollegiate Association of the New England States, composed only of Amherst, Wesleyan, and Williams. Meanwhile, the Yale-Harvard-Princeton agreement had been dissolved for trivial reasons, although their contests and comparative records, while not on a championship basis, are still watched with great interest. It is strange that in the national sport there should be no general intercollegiate association or code of playing rules; usually, though not without exception, the rulings of the professional league have been adopted.



The Game.—The game is played by nine men in each team, on a level field, on which is laid out the form of a 'diamond' 90 feet square, with bases at each of the four corners (see diagram). One of these bases is called the home-plate, and the others (beginning with the right) first, second, and third respectively. Within the diamond, in front of the home-plate and 60 feet from it, is the pitcher's position or 'box.'

The home team has the choice of innings—which team shall take the position 'in the field' or 'take the bat.' The fielders are divided into the *battery* (pitcher and catcher), the *infield* (the three basemen and short-stop), and the *outfield* (left, centre, and right fielders).

The fielding side having taken position, the pitcher delivers the ball to the batsman standing at the home-plate, who endeavors to hit it out of the reach of the fielders, and thereby succeed in reaching first base before the opposing side can field the ball to the baseman standing there. If the batsman fails to reach the base he is called 'out.' If he should reach the first base before the ball, and think it safe to do so, he next tries to reach the second base, and the third, or even the home-plate. When he has stopped at any base, another batsman is put in of his side, and he in turn attempts to hit the ball so as to allow the first batsman to advance around the bases, while he, in his turn, attempts to reach the first or any succeeding base. Then a third batsman of the same side comes in, and so on, until three men are put out in any way, when the other side takes its turn at the bat. A circuit of the bases is called a 'run,' and if any player makes it on a single hit it is called a 'home run.' A 'strike' is called (1) when the batsman fails to strike at a fair ball, i.e. one that passes over the home-plate between his knee and shoulder; (2) if he strikes at any ball, fair or otherwise, and fails to hit it; a foul hit, i.e. one that falls outside the lines from the home-plate to first and third bases extended, is called a strike, but the third strike is not called on a foul. The batsman becomes a base-runner (1) after three strikes are called; (2) when he makes a fair hit, the ball traveling between the above-mentioned lines until after it passes first or third base; (3) after four balls have been called by the umpire, a 'ball' being a pitched ball which is not touched by the bat and which passes outside the limits required for a strike; (4) if he is hit by the ball, unless he has made no effort to avoid it; (5) after the umpire calls a 'balk'; and (6) if prevented from striking by the interference of the catcher. In the last four cases, he cannot be put out before reaching first base. He is put out (1) when his third strike is held by the catcher; (2) when a ball hit by him is caught by a fielder before it touches the ground; (3) when touched with the ball in the hands of a fielder while between bases; (4) when, if forced to run to any base, the ball is held by a fielder on that base before the runner reaches it; and (5) when hit by a batted ball. Nine innings for each side constitute a game, and the team scoring the greater number of runs wins. In case of a tie at the end of the ninth inning, the play is continued until one side scores more than the other in the same number of innings.

For complete rules, consult Chadwick, *Official Baseball Guide*, in the Spalding Athletic Library (New York, annually). For practical instruction: Chadwick, *Art of Pitching, Fielding, and Base-running* (New York, 1886); and J. M. Ward, *Baseball* (Philadelphia, 1888).

BASE-COURT, bās′kōrt (Fr. *basse-cour*, low court). The lower or outer court of a mansion, corresponding to the outer bailey of a castle. It contained the stable-yard and accommodation for servants, such as offices, kitchen, stable, carriage-house, poultry-yard. It was distinct from the main quadrangle, and was sometimes built of timber. In farmhouses it is the part containing the outbuildings. The term was sometimes used for an inferior court of justice.

BASEDOW, bä′ze-dō, or **BASSEDAU**, JOHANN BERNHARD, often called BERNHARD VON NORDALBINGEN (1723-90). A German educational reformer of the Eighteenth Century. He was born at Hamburg, and studied philosophy and theology at the University of Leipzig. He became professor of moral philosophy in the Academy of Sorö in Denmark, in 1753; was transferred to the gymnasium at Altona in 1761, but was soon again compelled to give up teaching, though he retained his salary. At both Sorö and Altona, Basedow had fallen into difficulties on account of his extremely unorthodox religious views, expressed in both his teaching and his writings. While at Altona he came under the influence of Rousseau's *Emile*, and in 1767 definitely abandoned theology for educational affairs. His important position in education was due to his attempt to interpret and put into practical application the revolutionary ideas of Rousseau, by proposing a general reform in education in Germany in respect to organization, methods of instruction, and training of teachers. In 1768 he issued *An Address to the Friends of Humanity, and to Persons in Power, on Schools, on Education, and Its Influence on Public Happiness*, which included the plan for his *Elementarwerk*, a complete system of primary education. This was received with favor, and his appeal for funds with which to publish the proposed treatise met with generous response. The *Elementarwerk* was issued in 1774, and exerted a wide influence. The ideas underlying the work were a combination of the methods of the *Orbis Pictus* of Comenius (q.v.) and the general principles advanced by Rousseau. It contained a vast amount of general information, accompanied by numerous illustrations, arranged in dialogue form, and designed to direct and train, but never suppress, the natural desires of children. Public approval of the ideas advanced was generous, and Basedow immediately outlined a plan for the training of teachers for the new education.

The resulting institution was the celebrated *Philanthropinum*, founded at Dessau, and imitated in various parts of Germany. Basedow was unfit for the management of such an institution, and failed in carrying out his own ideas. The control of the *Philanthropinum*, under more competent hands, continued to exist until 1793, and exerted a wide influence. Basedow passed the last year of his life in private tutoring, and died in 1790. The fundamental idea of the reform was 'education according to nature,' which was interpreted to mean that children should be treated as children, not as adults; that language should be taught by conversational methods, not through grammatical studies; that physical exercise and games should find a place in the child's education; that early training should be connected with "motion and noise," since the child naturally loves these; that each child should be taught a handicraft, for reasons partly educational, partly social; that the vernacular rather than the classical languages should constitute the chief subject-matter of education; that instruction should be connected with realities rather than with words. Many of these reforms, suggested by Basedow, were carried out by more practical and less erratic reformers, such as Pestalozzi and Froebel. The great-grandson of Basedow was Prof. Max Müller, who contributed a "Life" of the reformer to the *Allgemeine deutsche Biographie*. A comparison of Basedow and Comenius by Petru Garbovicianu (Bucharest, 1887) is commended by Quick.

Consult: Quick, *Educational Reformers* (Cincinnati, 1879); Barnard, *German Teachers and Educators* (New York, 1861); Pinloche, *L'Education en Allemagne au dix-huitième siècle* (Paris, 1889).

BASEDOW'S DISEASE', GRAVES'S DISEASE, or EXOPHTHALMIC GOITRE. A disease characterized by palpitation of the heart, enlargement of the thyroid glands, anæmia, general nervousness, fine tremor and prominence of the eyeballs. It was first fully described by von Basedow in 1840. The exciting cause may be mental or physical shock, or anxiety or grief, fright, fatigue, sexual excess, or cold, in anæmic persons, or those with a nervous inheritance. It is 8.3 times as frequent in females as in males. Consult: Gowers, *Diseases of the Nervous System*, Vol. II.; Pepper, *Theory and Practice of Medicine*, edited by Billings and Delafield (Philadelphia, 1894); Mannheim, *Der Morbus Gravesii* (Berlin, 1894).

BASEILHAC, bȧ'zȧ'lyȧk', JEAN (1703-81). A French surgeon, better known as Frère Côme. He was educated at the Hôtel-Dieu, Paris, and for some time was physician in ordinary to the Archbishop of Bayeux. He invented the 'trocar,' used in cystotomy, and wrote *Recueil de pièces importantes concernant la taille faite par le lithotome caché* (1751), and *Nouvelle méthode d'extraire la pierre de la vessie urinaire par dessus le pubis* (1779).

BASEL, bä'zel, or **BÂLE**, bäl (anciently, *basilia*, royal residence, from Gk. *βασιλεύς*, *basileus*, king; *basula* in the Middle Ages). The capital of the half-canton of Basel-Stadt, Switzerland; lying on both sides of the Rhine, near the northern boundary of Switzerland (Map: Switzerland, B 1). The city is situated in a charming plain over 800 feet above sea-level, and is divided by the river into Grossbasel and Kleinbasel. The former, the higher portion of the city, is on the left bank, and is connected with Kleinbasel by three bridges, one of which, the wooden Alte Brücke (Old Bridge), was built in the early part of the Thirteenth Century. The city proper shows its mediæval origin, but about it are charming suburbs, occupied by the richer classes. The old ramparts have been leveled to form walks and promenades, the finest of these being the Sankt Alban-Anlage and the Eschengraben. In the Eschenplatz stands the Sankt Jakob Monument, to the memory of the Swiss who opposed the Armagnac invaders in 1444. Other memorials are the Strassburg Monument, by Bartholdi, commemorating the aid given by Switzerland to the women and children of that city after the siege of 1870, and the Holbein Fountain, restored in 1887.

Basel abounds in fine buildings, both mediæval and modern. Among these may be mentioned the Rathaus or Town Hall, built in the first quarter of the Sixteenth Century; the Cathedral, said to have been begun by Emperor Henry I.; and the Barfüsser Kirche, dating from the Fourteenth Century. The latter has a very high choir, and is now the quarters of the Historical Museum, which vies with that of Zürich as the finest in Switzerland. Other notable buildings are the Church of Saint Elizabeth, the Natural History and Art Museum, the Kunst Halle, containing a collection of modern paintings, the theatre, and the post-office.

Basel has a university which dates from 1459. The university library has about 230,000 volumes, and about 1500 MSS., chiefly dealing with the Reformation. The botanical gardens and the institute of natural sciences, as well as the clinics attached to the city hospitals, are also affiliated with the university. (For further details, see BASEL, UNIVERSITY OF.) Besides the university there are several high schools, and an industrial school and museum. The Historical Museum, which has been mentioned, contains some portions of the celebrated Danse Macabre, formerly a fresco in the Cathedral burial-ground and removed in 1805, besides a fine collection of mediæval furniture. Basel was the home of the Holbeins, and the museum contains a valuable collection of their works, and those of their pupils. There are several literary, musical, historical, and scientific societies. A notable organization is the Association for Public Welfare, which cares for schools and other institutions designed for the bettering of the condition of the poor and the afflicted, such as the blind, stuttering, etc. Basel's hospitals include a Polyclinic supported by the State, while its mission-house and Bible Institute are world-famous.

Basel has long been the leading commercial town of Switzerland and an important manufacturing centre. For more than 200 years the chief industry has been ribbon-making, now giving employment to more than 8000 people. Other branches of industry are paper-making, silk and thread spinning, dyeing and dye-making, and the preparation of the 'Baseler Leckerli,' or honey-cakes. The position of the city on the boundaries of Switzerland, Alsace, and Baden, and its location on the Rhine, here navigable, give it great advantages for trade, and it receives more than 50 per cent. of the entire imports of Switzerland. It is an important centre for the transport of the native products of the country, and as a result Basel is the most powerful financial city of Switzerland. Besides the communications given by the Rhine and the Rhine-Rhone canals, railroads from various parts of Switzerland form a junction in Basel, permitting connections with France.

The Basel-Stadt semi-canton consists of the city and three parishes; the cantonal councils have general jurisdiction over the city. In 1888 the population of the city was 74,245; in 1900, 112,885. Of these over two-thirds are Protestants, less than one-third Catholics, with about 3000 Jews.

Basel had its origin in the *Basilia* of the Romans, a frontier post situated near the town of Augusta Rauracorum. It was taken in turn by the Alemanni and the Franks, and, on the partition of Charlemagne's empire, passed to Louis the German. In the Eleventh Century it enjoyed great prosperity as a free Imperial city, ruled by its bishop and the chief nobility. In the course of many years the burghers acquired a large share in the municipal government, while at the same time, the authority of the city, by purchase and conquest, was extended over a broad stretch of territory. Basel fought with the Swiss confederates against the Hapsburgs in 1444, and formally joined the Confederacy in 1501. The Reformation made rapid progress in Basel. The government of the city became thoroughly democratic, but toward the inhabitants of the rural districts of Basel a policy of consistent selfishness was followed, in that they were allowed no share in the political life of the community for nearly three centuries. Under the impulse of the French Revolution equality of rights was established, but the city became supreme again after 1814. Civil war broke out as a result in 1831, and continued until 1833, when the Federal Government intervened and brought about the division of the canton into *Basel-Stadt* and *Basel-Land*. The latter immediately established democratic institutions, but Basel-Stadt maintained its reactionary character till well into the second half of the Nineteenth Century. Consult *Guide to Basle and Environs* (Basel, 1895).

BASEL, Confession of. (1) Written by Oswald Myconius (q.v.), in 1534, and the one still used in Basel. (2) The First Helvetic Confession (1536), also called The Second Confession of Basel, because there drawn up. It was too Lutheran, and so was supplanted by the Second Helvetic Confession (1564).

BASEL, Council of. A memorable and important ecclesiastical council, held in the city of Basel from 1431 to 1449. It was summoned by Pope Martin V., by a bull dated February 1, 1431, and constituted after a fashion on February 27, but after the Cardinal legate, Julian Cesarini of Sant' Angelo, who had been charged with the conduct of the Council, arrived, September 9, 1431, more life was put into it. Its chief business being to conciliate the Hussites, it at once opened negotiations with them. But the new Pope, Eugenius IV., disliked the proceedings, and requested Cesarini on November 12 to dissolve the Council and call another a little later at Bologna. Ere the letter came the Council had formally constituted itself (December 14), and when the Pope's letter arrived it flatly refused to dissolve, and reaffirmed the decree of the Council of Constance, asserting the right of a general council to exercise authority over the Pope himself, and on his persevering to issue bulls for its dissolution, caused a formal process to be commenced against him, and cited him to appear at its bar. It assumed the Papal powers, and exercised them in France and Germany, where its authority was acknowledged. It concluded a peace, in the name of the Church, with the Calixtines, the most powerful section of the Hussites, by the so-called Compactata of Prague of November 30, 1433, granting them the use of the cup in the Lord's Supper. By this, the Emperor Sigismund was greatly aided in recovering possession of Bohemia; and he in return sought to reconcile the Council with Eugenius IV., who, being hard pressed by insurrections in the States of the Church, and, afraid of losing his whole influence in France and Germany, came to a temporary agreement with the Council August 1, 1433. Desirous, however, of limiting the Papal prerogatives, the Council restored to the chapters of cathedrals and collegiate churches the free right of election to stalls and benefices, of which the Pope had assumed the right of disposing; and with a view to the reformation of gross abuses, restricted the practice of appeals to Rome, and prohibited *annats* and other grievous exactions. It left the Pope the right to dispose of those benefices only which belonged to the diocese of Rome, and prohibited the bestowal of reversions to ecclesiastical offices. It also appointed punishments for certain immoralities in the clergy; and prohibited 'festivals of fools,' and all the indecencies which had been commonly practiced in churches at Christmas. It adopted decrees concerning the election of Popes, and for the regulation of the College of Cardinals.

Eugenius, exasperated to the utmost, complained loudly to all sovereign princes. At this time the prospect was opened up of the union of the distressed Greeks with the Church of Rome, and both the Pope and the Council endeavored to make use of this for the advancement of their own interests and influence. Both dispatched galleys for the Greek deputies; but through the intrigues of his agents, the Pope was successful and brought the Greek deputies to Ferrara. The Archbishop of Taranto, a Papal legate at Basel, circulated an ordinance in the name of the Council, and sealed with its seal, recommending Udine or Florence as the place of conference. This was a high-handed proceeding, as not the Council, but only a minority of the Council, desired such a transfer, and the use of the seal was unauthorized. The Archbishop of Taranto was arrested, but he escaped. Yet the Pope followed the minority, and issued a bull calling a council at Florence.

This proceeding put an end to forbearance on the part of the Council, which, on July 31, 1437, again summoned the Pope to its bar, and on his failing to appear, not only declared him contumacious (October 11, 1437), but on his transferring the Council to Ferrara, went so far as (on January 24, 1438) to decree his suspension from the functions of the Papacy. His party was, however, so strong that this decree could not be carried into effect; while some of those who had been among the more influential members of the Council, the Cardinal legate Julian himself, and the greater number of the Italians, had shortly before left Basel and gone over to the Pope's side. All the more resolutely did Cardinal Louis d'Allemand, Archbishop of Arles, a man of most superior understanding, courage, and eloquence, now guide the proceedings. On May 16, 1439, the Council declared the Pope a heretic for his obstinate disobedience to its decrees; and on June 25, 1439, formally deposed him for simony, perjury, and other offenses, and elected Amadeus VIII. of Savoy in his stead. He called himself Felix V. (q.v.).

In the latter part of 1443 Felix V. left Basel and went to Lausanne. On May 18, 1448, Frederick III. forbade the city of Basel longer to harbor the Council. So, on June 25, it decreed its transfer to Lausanne; and there, on April 25, 1449, it decreed its dissolution. The Council had shown itself powerless to effect the reforms in the Papal Curia with which it had set out, and was on the whole a failure. Its reforming decrees are held to be invalid by the Roman Catholic canonists; but extreme Gallicans, such as Richer, recognize it as ecumenical all through, and the more moderate ones, with Natalis Alexander, up to the prorogation to Ferrara.

Consult: *Monumenta Conciliorum Generalium Sæculi XV.* (Vienna, 1857-96); *Concilium Basiliense. Studien und Quellen zur Geschichte des Konzils von Basel*, edited by von Haller (3 vols., Basel, 1896-1900); also C. J. Hefele, *Konziliengeschichte*, Vol. VII. (Freiburg, 1891).

BASEL, Treaties of. Two important treaties of peace, concluded at Basel on April 5, and July 22, 1795, the first between France and Prussia, the second between France and Spain. Prussia withdrew from the coalition against France, took under her protection all the States of Northern Germany which should, like herself, relinquish the war in which the German Empire was engaged, and gave up her possessions beyond the Rhine. The treaty is important in that it put back for some time all possibility of German unity. Spain gave up her portion of Haiti, and prepared the way for that alliance with France which was afterwards productive of consequences so important during the Napoleonic wars.

BASEL, University of. A university authorized by a Papal bull in 1459, and opened in 1460. During the Reformation, it was reorganized on a Protestant basis and became the stronghold of Protestant scholarship, and as such exerted an influence throughout the world. Erasmus, who came to Basel in 1520, and Œcolampadius, who came in 1523, were among the famous teachers, and at a later day, Euler and the Bernoullis were renowned professors of mathematics. Basel is now the chief seat of theological study in Switzerland. It has also faculties of law, medicine, and philosophy, a library of 230,000 volumes and 1500 manuscripts, besides other valuable collections and museums.

BASE LEV′EL. See Physiography.

BASEL′LA (probably a native name in Malabar). A genus of tropical plants belonging to the natural order Chenopodiaceæ. The genus is now believed to consist of but one species—*Basella rubra.* Various forms of this are cultivated in the tropics as pot-herbs, and in the neighborhood of Paris plants are sometimes raised in hot-beds, and planted out as a substitute for spinach. It is sometimes cultivated as an ornamentatal climber in greenhouses. One form yields a rich purple dye, and one twining South American form produces edible fleshy roots.

BASE′MENT (Fr. *bas*, low; cf. Eng. *base*, low, mean). In architecture, the lower story of a building (when the lower story is not its main story). It is otherwise architecturally marked off from the rest of the house. In modern architecture we speak of basement houses of various kinds, such as the *English basement*, the *French basement*, the *American basement.* Mediæval and Renaissance palaces, almost invariably, were built with basements, which contained porter's lodge, storerooms, offices, etc. The architecture of the basement was usually more massive and plainer than that of the rest of the house; the windows were smaller than those of the other stories, and often barred. In many cases this basement itself consisted of two stories, the upper one being a mezzanine where the servants had their quarters.

BASE OF OP′ERA′TIONS. The base or point from which active operations against an enemy are directed or organized, and from which are issued such stores and munitions of war as may be required by the force whose base it is. In countries sparsely populated, armies—and particularly the invading army—must be victualed and supplied from their own base. Lines of operation, therefore, follow navigable rivers or railroads; and the base is fixed at such a point on the line or route as to be as secure as possible from molestation, and yet, if necessary, give protection and shelter to the troops, should they be driven back. The more important field-hospitals are also stationed at the base. To separate or cut off an army from its base, is to practically defeat it; the attainment or defeat of such an end being a consummation ardently sought for. The history of the American Civil War (1861-65) is full of instances of such manœuvering. Grant's operations against Vicksburg in December, 1862, are a case in point. He was prevented from carrying out the movement he had planned, because of the severe attacks made upon his lines by Van Dorn and Forrest, the Confederate raiders. Holly Springs, an important base of Grant's forces, was rushed and captured by Van Dorn, together with large stores of food, arms, and ammunition. Grant's advance was made impossible, for starvation stared him in the face, and he was compelled to fall back to reëstablish his base. In the British-Boer War of 1899-1902, England was forced to keep nearly twice as many troops as there were Boers actually in the field for the sole purpose of guarding the various bases of supplies and operations. This was due to the wide area of the theatre of operations, the absence of available rivers, and the necessity of transporting the large quantities of food and ammunition required for the vast armies in the field.

BASEY, bä′sâ. A town of Samar, Philippines. Population, in 1898, 13,756.

BA′SHAN (Heb., rich soil, in Gk. *βασάν*, *Basan*), or **BAT′ANÆ′A.** A country of Palestine, stretching from Mount Hermon in the Antilibanus on the north to the brook of Jabbok on the south, and from the Jordan on the west to the boundaries of the Geshurites and Maachathites on the east. Ashtaroth, Edrei, Golan, and Salchah were its chief cities. According to the account in Num. xxi. 33-35, and Deut. iii. 1-3, the last of its Amorite rulers was the giant Og, who, with all his sons, was killed by the Israelites under Moses at the battle of Edrei, and the land given to the half tribe of Manasseh (Josh. xiii. 29-31). Bashan, as a rich pasture land, was famed for its sheep and oxen, which, because of their large size, suggested to the prophets types of oppressors (Amos iv. 1). In the days of Greek supremacy in Palestine, Bashan belonged to the monarchy of Philip, and afterwards under Roman rule, to that of Agrippa II.

BASH′FORD, James Whitford (1849—). An American educator, born at Fayette, Wis. He graduated at the University of Wisconsin in 1873, studied at the theological school of Boston University, and in 1875-89 was pastor of Methodist Episcopal churches at Boston and Auburndale, Mass., Portland, Maine, and Buffalo, N. Y. In 1889 he was appointed president of Ohio Wesleyan University (Delaware, Ohio). He has published a text-book, *Outlines of the Science of Religion.*

BASHI, băsh'ĭ (Turk. *bashi*, head, chief). A generic title for Turkish military officials. Some of the most prominent are: *Toptchjy-Bashi*, general of artillery and inspector of forts, etc.: *Solaki-Bashi*, commander of the archers (now practically extinct); *Sanjak-Darlars-Bashi*, chief of the fifty color-bearers; *Konadji*, or *Konakji-Bashi*, quartermaster-general (or chief of the barracks); *Boyuk-Bashi*, great high chief, or colonel of a regiment of 1000 militia. Other military and civil Turkish titles are: *Pasha*, general—which title, however, may be conferred as a distinction on naval officers or distinguished professional men in the civil walks of life. It is the Turkish equivalent of the European 'Lord,' or 'Baron,' and is the title of viceroys, provincial governors, etc. *Bey*, a civil title equivalent to the English baronet or knight, which may be conferred on all classes, civil or otherwise. *Effendi*, the courtesy title of a gentleman, used in the same relation as the English word esquire. *Bimbashi*, or *Hinbashi*, is the title adopted in the Anglo-Egyptian Army for the colonel of a battalion or regiment; its native usage is 'leader of a thousand.' *Beg*, or *Beik-Bey* is a title commonly applied to all military and naval officers and distinguished visitors. It applies also to the governor of a small district, who displays a horsetail as an insignia of rank.

BASHI-BAZOUKS, băsh'i-bȧ-zōōks' (Turk. *bashi*, head, head-dress, appearance + *bozuq*, spoilt, disorderly, from *boz*, to spoil, damage, destroy). Turkish irregular troops; natives chiefly of the wretchedly governed pashalics of Asiatic Turkey, and possessing the worst reputation of any body or class of fighting men in the world. They are wild, turbulent, and wholly undisciplined, more ready to plunder and kill than to fight, and speak a debased Turkish *patois* not easily understood. Physically, they are, as a rule, men of splendid proportions, their tall red fez adding to their apparent height, while the uniform *ensemble*—not unlike the Scottish Highlander—adds to their picturesque appearance. Their equipment consists mainly of a great number of knives and swords, completely loading the waist belt, and compelling them to adopt a gait peculiar to themselves, caused by the necessity of swinging the arms and legs clear of their equipment. Such rifles as they usually possess are of patterns long since obsolete. They are willing to attach themselves to any leader who understands their jargon, and who can promise them plunder, and are frequently used by municipal governors depending on pillage and plunder for their pay. It was thought, during the Crimean War of 1854, that they could be usefully employed against the Cossacks, particularly in the sort of irregular warfare usually waged by them. Consequently, in 1855, when the British Government took into its pay a Turkish contingent, a corps of Bashi-Bazouks was put under the command of an officer of the British-Indian Army. The experiment, so far as the Bashi-Bazouks were concerned, proved a complete failure, as the war ended before they were even partially reduced to discipline. They frequently torture their enemies, and mutilate the dead. It is a matter of record that in May, 1876, under the leadership of Achmet Agha, they slew in cold blood over 1000 defenseless Bulgarians who had sought shelter in a church.

BASHI (bä'shê) **IS'LANDS.** A small group of islands, the northernmost of the Batan group in the Philippines. The name Bashi is sometimes applied to the whole Batan group. Bashi Channel separates the islands from Formosa.

BASHKIRS, bȧsh-kērz'. A Finno-Turkic people of Mongolian stock (height 1.650 metres), living in the Orenburg District of Russia, along the slopes of the Urals. They number about 1,000,000, and subsist on their flocks and herds. In faith, the Bashkirs are Mussulmans; their language is Tatar.

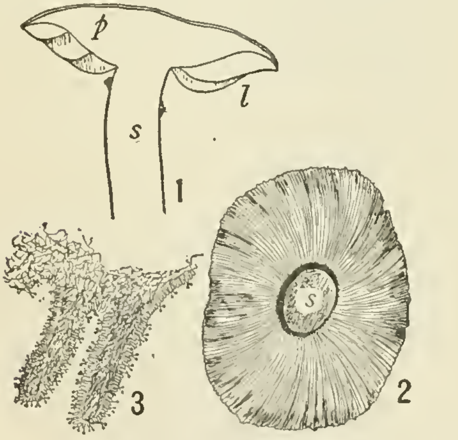
BASHKIRTSEFF, bȧsh-kērt'sĕf, MARIE (1860-84). A Russian artist and writer, one of the most individual characters in the literary annals of the Nineteenth Century. She was born in Russia, and died of inherited consumption in Paris. Her parents were very wealthy and of noble descent, and their daughter, who was gifted with beauty, an unusual voice, and a mind of remarkable maturity, had the advantage of residence in Rome, Nice, Paris, and other cities, where she moved in the highest society. A weakness of the throat, followed by deafness, obliged her to abandon the hope of achieving fame as a singer, and in her seventeenth year she began the study of art in Paris under Robert-Fleury, pursuing it later under Bastien-Lepage until her death, and producing, in spite of her physical disabilities, paintings of much merit. Her peculiar work, however, was a journal begun in her thirteenth year and faithfully continued. It was designed for publication after her death, and intended to be, to use her own words, "the transcript of a woman's life—her thoughts and hopes, her deceptions, weaknesses, good qualities, sorrows, and joys." She herself believed it to be unparalleled in literature, and the same opinion was expressed by Gladstone, one of her many reviewers (*Nineteenth Century*, October, 1889). Consult: *Journal de Marie Bashkirtseff* (Paris, 1887), and the full translation of the same (Chicago, 1890); *Lettres de Marie Bashkirtseff* (Paris, 1891); the suppressed portions of her diary have appeared in the *Revue des Revues*, February and September, 1900.

BA'SIC BES'SEMER STEEL PROC'ESS. See IRON AND STEEL, METALLURGY OF.

BASID'IOMYCE'TES (*basidium*, see below + Gk. *μύκητες*, *mykētes*, mushrooms, fungi). Probably the largest of the great groups of Fungi in number of species. It includes the smuts (Ustilaginales), the numerous rusts (Uredinales), and the immense assemblage of forms called mushrooms, toadstools, bracket-fungi, and puffballs, besides many smaller groups. The higher forms of Basidiomycetes are readily distinguished by the peculiar method of spore-formation. The end of a filament (hypha) becomes swollen, and then puts out generally four small processes, which become spores attached to the end of the parent filament by delicate stalks ('sterigmata'). Such a filament is called a 'basidium' (dimin. of Gk. *βάσις*, *basis*, base, foundation), and its spores 'basidiospores.' The basidium is in all essentials the same, whether the fructification be a mushroom, toadstool, bracket-fungus, puffball, or some simpler structure. The smuts and rusts, however, present conditions that have only within comparatively recent years been related to the basidium. This matter is discussed in the article on FUNGI, and for an account of the structure and habits of these groups, see USTILAGINALES and UREDINALES.

In this brief account, attention must be given chiefly to the mushrooms, toadstools, bracket fungi, and puffballs, which comprise the bulk of the Basidiomycetes. In these groups the spore-bearing surface (hymenium) covers specialized regions of the body, the most familiar being the knife-blade-like plates or gills of most toadstools (Agricales), the minute pores in the under side of the bracket-fungi (Polyporales), and the pointed teeth in the hynales. In the puffballs, the spore-bearing surface lines a labyrinth of chambers ('gleba') in the interior, which become quickly disorganized so that the mature puffball is hardly more than a capsule ('peridium') inclosing a powdery mass of spores. The structures called toadstool, bracket-fungus, or puffball, are really only the fructifications of extensive thready bodies (mycelium) that penetrate the substratum in all directions. Thus the toadstools and mushrooms (edible toadstools) that come up on the lawns and in pastures have been formed and nourished by a cobweb-like growth of filaments that spreads through many square feet of the soil. Such forms often appear in more or less complete circles ('fairy rings'); which indicates that the body is advancing through the soil from some centre of infection.

The toadstool develops from a small ovoid body beneath the surface of the ground. In this structure the parts of the mature fructification are differentiated, so that the latter may quickly expand at maturity. The stalk ('stipe') then rapidly elongates, carrying aloft the cap ('pileus') and frequently leaving at the base a sort of cup ('volva') into which the stalk fits. In some forms there is also a ring just below the cap (pileus), which ring is the remnant of a membrane that held the pileus folded against the stalk. The presence or absence of a volva or ring, the structure of the gills, and the color of the spores are the most important systematic characters of toadstools. Thus, the members of Amanita, the most dangerous genus among the toadstools, has white spores, a volva, and a ring.



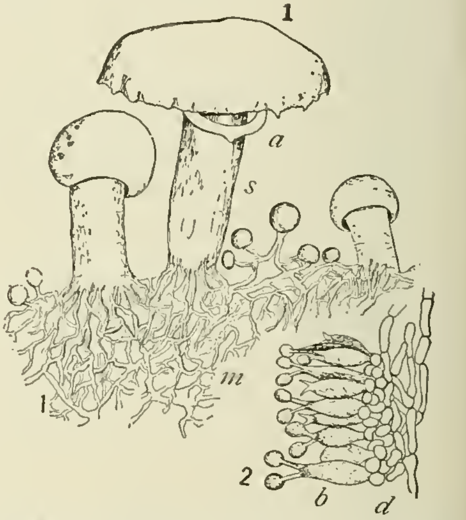
BASIDIOMYCETES.

A common mushroom: *1*, longitudinal section, showing stipe (*s*), pileus (*p*), and gills (*l*); *2*, the pileus from beneath; *3*, magnified view of a section of two gills, showing how the spores are attached.

The puffballs (Gasteromycetes) present various conditions with respect to the structure of the parchment-like envelope (peridium), which may be simple, rupturing irregularly; or composed of several layers and provided with special openings for the escape of spores. The 'Earth stars' (Geaster) and the 'Bird's-nest fungi' (Nidulariales) are highly developed types.

Very different is the group of the 'Stink-horns' (Phallales). This order comprises a series of forms very remarkable in their structure and development, but whose habits take away any natural beauty. The masses of spores are exposed on a stalked structure that emits the most penetrating odor of carrion. It is interesting to know that this scent attracts flies, and probably serves a useful purpose to the plant in distributing the spores.

For an extensive account of the Basidiomycetes, consult Engler and Prantl, *Die natürlichen Pflanzenfamilien* (Berlin, 1899); and in English, Stevenson, *British Hymenomycetes* (London, 1886). A large number of books on toadstools and mushrooms have been published in America, the most extensive being Atkinson, *Studies of American Fungi* (Ithaca, 1900). See MUSHROOM; FUNGI; and plates illustrating these articles.



Agaricus campestris, the common edible mushroom: *1*, general habit, showing mycelium (*m*), stipe (*s*), annulus (*a*), and pileus; *2*, portion of gill highly magnified, showing the basidia (*b*) with their spores, and the hyphæ (*d*) from which they arise.

BASIL, băz′ĭl (Gk. βασιλικός, *basilikos*, royal) (*Ocimum*). A genus of plants of the natural order Labiatæ (q.v.). The species are all natives of the tropics, or of the warmer temperate parts of the world, and are generally characterized by a pleasant aromatic smell and taste. Sweet Basil (*Ocimum basilicum*) is an annual plant, a native of the East Indies, about one foot high, with ovate or oblong leaves, which has long been cultivated in Europe for seasoning food. Bush Basil (*Ocimum minimum*) and Tree Basil (*Ocimum gratissimum*), also natives of the East Indies, are cultivated in gardens for the same purpose. *Ocimum campechianum* is a native of Florida and tropical America. Basil is a common name for Pycnanthemum, a

North American genus of many species; also of *Calamintha clinopodium* of Europe and North America. *Acinos vulgaris* (now *Calamintha acinos*) is a native British plant known as Basil thyme. Basil vinegar is made by steeping the leaves of basil in vinegar, and is used for seasoning when the fresh plant cannot be had.

BA'SIL THE GREAT (c.330-379). Bishop of Cæsarea in Cappadocia, founder of Eastern monasticism, theologian, and doctor of the Church. He was born at Cæsarea, of Christian parentage, about the year A.D. 330, and died there, January 1, 379. He is often grouped with his brother, Gregory of Nyssa (q.v.), and Gregory of Nazianzus (q.v.), under the general title of 'the three Cappadocians,' all being distinguished leaders of Trinitarianism and successors of Athanasius. Basil received a careful education, under such teachers as the rhetorician Libanius, at Constantinople, and Himerius, at Athens. Here (351-355) two of his fellow-students and friends were Gregory of Nazianzus and Julian, afterwards Emperor. Returning to Cæsarea, Basil entered with zest into the social life of the city, and thus aroused the anxiety of his pious sister, Macrina, who wished him to embrace the religious life. This he was soon led to do. He first visited the famous hermits of Syria, Palestine, and Egypt, and then took up his abode in a picturesque spot on the banks of the Iris, in Pontus, where he gathered a few sympathizers about him and spent several years in severe asceticism. So great were his austerities that he was described as being 'without flesh and almost without blood.' His monastic period falls between A.D. 357 and 364. The rule of Saint Basil is still the standard of the Oriental monks. It was less systematic than that of Saint Benedict (q.v.), which arose later in Italy and controlled the monastic development of Western Europe, but it included the characteristic features of monachism; viz. a union of active labor and quiet devotion with strict asceticism.

Basil was made presbyter of Cæsarea in 364. His intense activity and devotion to the people soon gave him an influence greater even than that of the local bishop. He went about establishing new communities of monks, and founding hospitals, orphanages, etc. During a particularly severe famine (368) his labors were little short of heroic. All this time his theological position was becoming more clearly defined. He had originally sympathized with the mediating party in the Arian controversy (see ARIUS), though his primary interest was not in dogma, but in the practical religious life. But his antagonism to the thorough-going Arians led him ever closer to the orthodox side. This attitude aroused hostility, and when the bishopric of Cæsarea became vacant (370), and he was a candidate for the position, there was violent opposition. He was, however, elected, and his administration proved to be vigorous and successful. The office carried with it a virtual primacy of the churches in that part of Asia Minor. He was Metropolitan of Cappadocia and Exarch of Pontus, having many bishops under him, who were often opposed to his policy. But firmness and patience overcame opposition, even from the Arians, his greatest foes. A notable instance of Basil's courage was his withstanding the demands of the (Arian) Emperor Valens, in 372, when, in spite of threats of deposition, the bishop refused to surrender his orthodoxy or grant any favors to heretics. The Emperor is said to have been so impressed by Basil's dignity and courage, that he left him in peaceful possession of his see.

As a theologian, Basil ranks below Athanasius, and below his brother Gregory. In common with the other Cappadocians, he emphasized the trinity rather than the unity of the Godhead. The completed Trinitarian formula asserted one substance (*ousia*) and three persons (*hypostases*). In the form in which Basil taught this doctrine, it laid him open to the charge of tritheism. One of Basil's greatest disappointments arose from his failure to secure doctrinal harmony between Eastern and Western Christendom. In support of Catholic orthodoxy he was compelled to look toward the West, but his overtures were received with marked coolness at Rome. Pope Damasus never forgave Basil for his failure to recognize the Roman claim to primacy; and Jerome accused him of stubborn pride in thus persistently refusing Damasus due honor. Moreover, Basil's orthodoxy was for a long time under suspicion, for in his early life he had been known to have friends among the Arian heretics. He died before East and West came to an agreement.

Basil was master of a fine literary style. His works include expositions of the Bible, dogmatic, moral, and ascetic treatises, liturgical pieces, and letters. *The Liturgy of Saint Basil* is not wholly his work. Some 370 letters are preserved. The best complete edition of his works is the *Benedictine* (3 vols., Paris, 1721-30; reprinted in Migne's *Patrologia Græca*, Vols. XXIX. XXXII.). His chief works are translated into English in the *Nicene and Post-Nicene Fathers*, 2d series, Vol. VIII. (New York, 1895), with valuable prolegomena containing a sketch of his life and an analysis of his works. Consult, in general, Smith and Wace, *Dictionary of Christian Biography*, art. "Basilius of Cæsarea" (London, 1887).

BASIL I. (c.813-886). Byzantine Emperor from 866 to 886, and founder of the Macedonian dynasty. He was of Slavic descent, and when a boy entered the service of Michael the Drunkard (q.v.) as a groom. By his strength and bravery he attracted the Emperor's notice and won his favor. He was promoted rapidly until he was made protostrator, or Count of the Stables. He was the Emperor's boon companion, and after the murder of Bardas, in 866, he was chosen by Michael to be his associate in the Empire. The next year Basil, who had obtained a firm control of the Government, caused Michael to be murdered. The deed was unrevenged, no party took up the cause of Michael's children, and Basil ruled, until 886, with remarkable ability. The Empire was enlarged by the addition of new provinces in the east, which more than counterbalanced the loss of Syracuse in 878. Everywhere else, his armies and fleets were successful. At home he reformed the finances, began a recodification of the laws (see BASILICA), and worked earnestly to improve the administration. He reinstated Ignatius (q.v.) as Patriarch, and sought to end the schism between the Eastern and Western churches; but in this he failed. The Macedonian dynasty ruled at Constantinople for 190 years.

BASIL II. (957-1025). Byzantine Emperor from 976 to 1025. He was the son of Romanus II., and at his father's death was only two years old. He and his brother Constantine became emperors in 976, but Constantine left the Government to Basil, who was obliged to carry on almost incessant wars. He suppressed a formidable revolt in Asia Minor in 979, recovered Calabria and Apulia in Italy, and had several conflicts with the Saracens in Sicily. For many years he waged war against the Bulgarians, whom he finally subdued in 1018. Basil, for this victory, won the surname of Bulgaroctonus, 'Slayer of Bulgarians.' His reign of almost half a century was a period of victory and expansion for the Byzantine Empire.

BASILE, bȧ'zēl'. A villain in Beaumarchais's *Le Barbier de Séville* and *Le Mariage de Figaro.*

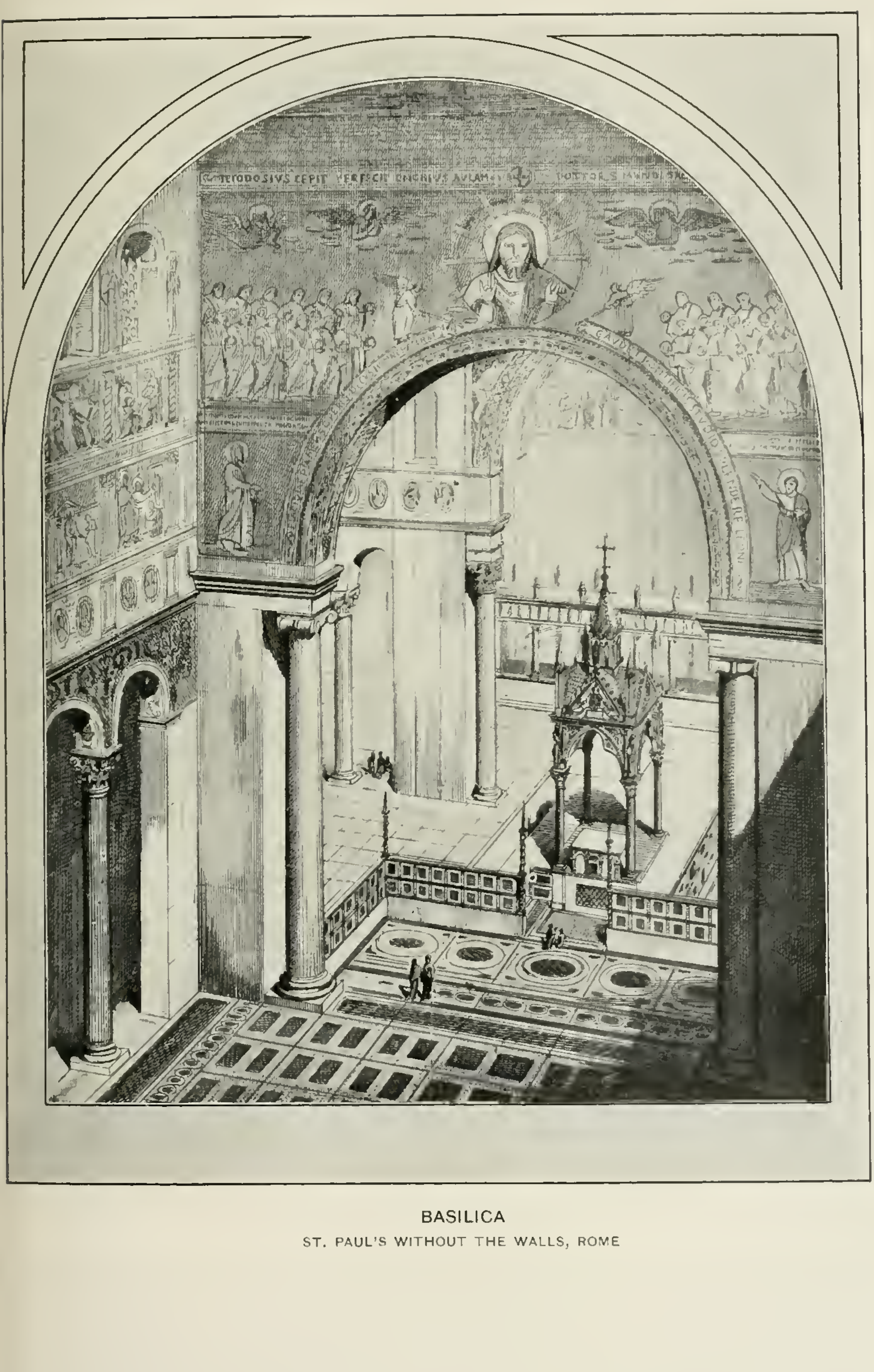
BASILE, bȧ-sē'lȧ, GIOVAN BATISTA, Count of Torone (Seventeenth Century). An Italian author, born at Naples. His literary productions in the Neapolitan dialect are most valuable. His *Pentamerone overo lo cunto de li cunte, trattenemiento de li peccerille di Gior. Alesio Abbatutis* (Naples, 1627; frequently reprinted), a collection of 50 folk-tales somewhat resembling the *Decameron*, is one of the most popular books of its kind, and has been translated into various European languages. English translation by J. E. Taylor (London, 1850).

BASIL'IAN ART. A term used to describe the style of architecture and other arts fostered by the monks of the Order of Saint Basil, especially in the Orient. It is described under MONASTIC ART.

BASILIAN MONKS, or **MONKS OF SAINT BA'SIL.** An order founded by Saint Basil, Bishop of Cæsarea, in 358; it grew to large numbers before the death of the founder (379). They were numerous in Spain, Italy, and Sicily, and the greater portion of the monks of the Greek Church are of the order. There are some in the United States and Canada. There are also Basilian nuns, who call Macrina, the sister of Basil, their founder. The records of the order show that it furnished 14 Popes, many cardinals, and nearly 12,000 martyrs. The rule of Basil is the foundation of that of Benedict, the great founder of Western monasticism.

BASIL'ICA (Lat., from Gk. *βασιλική, basilikē*, royal, scil. *στοά, stoa*, porch). The large colonnaded building used by the Romans as part of their forums for the transaction of business and legal affairs; also the common type of the early Christian churches. The name seems to be Greek, but the earliest known examples are Roman. Vitruvius (q.v.) says: "Basilicas ought to be built in the warmest quarters of the marketplaces, in order that, in winter, the merchants assembling there may not be inconvenienced by bad weather;" and elsewhere he speaks of the tribunal projected like a hemicycle from the main building, so "that those who stand near the magistrates may not be disturbed by those doing business in the basilica." These buildings varied in proportions and arrangement. Vitruvius, who built one himself at Fanum, says that they should be oblong, their width being between one-third and one-half of their length, and divided into three parts by two rows of columns, the central part being three times as wide as the two sides, which are called porticoes. A second story is made over the porticoes by a second series of shorter columns forming a gallery with a marble parapet, which usually extends also across the short ends, and was used for promenaders and spectators. At one of the short ends a tribunal projects in the form of a semicircular or square apse. Here sits the judge, or prætor, surrounded by his assessors or jurymen; it is often partly screened off from the main body of the building by smaller columns, and is on a higher level. On either side of it is a small room connected with it—cabinets or robing-rooms. There are many variations from the three-aisled type described by Vitruvius. Some are halls with a single nave, without porticoes or galleries, as at Aquino and Palestrina; others—and these the most splendid—have as many as five aisles, with four rows of columns; e.g. the Basilicas Julia and Ulpia; others have two hemicycles, one at each end, as Trajan's Basilica Ulpia; others are virtually square in form, as at Otricoli; others—and these are the majority—have no upper galleries; others, finally, have heavy piers and vaults in place of colonnades and wooden roof, as the colossal Basilica of Constantine. The tribunal end appears to have had a solid wall, but on the other three sides the building was open, with either a simple colonnade (Ulpia) or a mixed arcade with engaged columns and architrave (Julia) such as we are familiar with in the Coliseum. Some, however, were inclosed by walls on all sides; this was the case at Pompeii. For five hundred years the Romans built basilicas (c.200 B.C. to A.D. 300) as one of their most characteristic and sumptuous monumental expressions, alongside of their memorial arches, aqueducts and *thermæ*. Until B.C. 184 their commercial and judicial business had been mostly transacted in the open forum. But in that year the Basilica Porcia was built (burned in B.C. 52); in 179 the Fulvia; in 169 the Sempronia; in 121 the Opimia; in 46 the Julia. Pliny calls the Æmilia and the Julia two of the four most superb monuments of Rome. They flanked the Forum on opposite sides and their ruins are recently being studied with great care. Everywhere that Roman colonies were established under the late Republic and the Empire, basilicas were built in connection with the forums. They were the necessary outward sign of the Roman law, the seat of justice, as well as of trade. The earliest basilica in good preservation is that at Pompeii, which has excited the greater interest because it may represent the original Greek type: it has an open porch, five doors, three naves, a portico across both ends, and a well-preserved, raised, oblong tribunal at one end. Other examples exist: in the Orient, at Palmyra; in Germany, at Treves. In Rome itself the two most famous examples built under the Empire were the Ulpia, erected by Trajan in his forum, and that begun by Maxentius and finished by Constantine, unique for its immense vaulting of tunnel and groin vaults; for all other known basilicas appear to have had wooden roofs. It is a common error to suppose that they were not roofed at all over the central space, but only over their side aisles or porticoes.

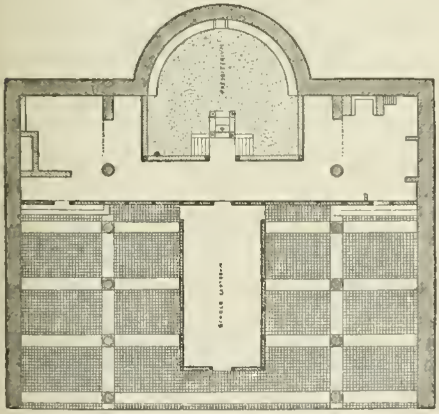
The Roman public basilica was therefore a sort of covered forum. The term was, however, extended to other colonnaded halls and porticoes


TEODOSIVS CEPIT PERFECIT ONORIVS AVLAM

BASILICA

ST. PAUL'S WITHOUT THE WALLS, ROME

of similar plan, but connected with theatres, baths, temples, and even palaces and villas. The largest room in sumptuous houses, with a higher roofed central section with windows and two rows of columns forming lower side-aisles, frequently served wealthy converts to Christianity in the earliest times as a place of worship. As the only type of covered structure suitable for large gatherings was known as a basilica, it was natural that this name should be adopted for Christian churches. The arrangements suited the requirements of the Christian liturgy. The hemicycle became the apse; the bishop and presbyters sat where the judge and his assessors had been; the congregation could conveniently be arranged along the side porticoes or aisles, men on one side, women on the other (or, in the East, men below and women in the galleries). The type of Roman basilica, which was walled in on all sides, was selected, not that with open arcades. The main change was the omission of the cross-galleries across the short ends. In the article CHURCH, the different types and names used for the Christian place of worship are given. It is customary to call all churches built before the Gothic period 'basilicas,' except certain Byzantine domical churches, built in a shape altogether different—squarer than that of the basilicas. Then, when the mediæval builders of the north of Europe developed the transept and the choir, the prevailing type was no longer the basilical. Only in Italy do we find the primitive type preserved as late as the Twelfth and Thirteenth centuries in certain provinces, especially that around Rome and in Tuscany. There was greater uniformity in Christian basilical churches than there had been in Roman basilicas. The oblong plan gave almost always a length equal to one and one-half widths or a little over; the two (or four) rows of columns (or very seldom square piers) dividing the nave from the aisles supported sometimes a straight architrave, sometimes a row of narrow arches; the walls were thin, supporting only wooden roofs, with the rafters and frame showing; sometimes there was a narthex or portico at the entrance, and at the opposite end, in the largest basilicas, a cross-nave intervened in front of the apse, in the centre of which stood the altar. The early basilicas had but a single apse, but by the Sixth Century a smaller apse was often added on either side, developed from the two side-chambers of the ancient basilica, which had become sacristy and treasury in the earliest churches. In the East, the gallery over the aisles was preserved and used for the women, according to the Eastern custom, which required the most rigid separation of the sexes. In Italy, it was thought sufficient to put them in different aisles, so galleries went out of use as unnecessary. Until the Sixth Century the basilical form ruled everywhere; then the Orient adopted Byzantine models. The best examples of this early period are: Santa Maria Maggiore, Santa Sabina, Santa Agnese, all at Rome; Church of the Nativity at Bethlehem; Sant' Apollinare Nuovo, Sant' Apollinare in Classe, San Francesco, and San Vittore at Ravenna; Saint John at Constantinople; Saint Demetrius at Salonica, the Crocifisso at Spoleto; the cathedrals at Parenzo, Triest, and Grado. In Central Syria, where there are remarkable ruined Christian towns, deserted ever since the Mohammedan invasion in the Seventh Century, there are important basilicas at Shakka, Tafka, Kennawat, Sueideh, Kerbet-Hass, El-Barah, Babuda, Rueiha, Der-Seta, Bakuza, Kalb-Luzeh, Turmanin, Behioh, Kalat-Seman, etc. With a very limited territory, restricted to southern Europe, the second period of basilical architecture opened in the Seventh Century, with its centre more than ever in Rome, and depending for its spread upon monasticism and missionary work. In Gaul, Germany, England, and Scandinavia, the form of the basilical church was spread or introduced; but the decadence of architectural form made the churches erected up to the Eleventh Century of little moment, except in good Roman examples, such as Santa Prassede. Then, when the revival came, the old basilical plan, so perfectly and artistically represented by Santa Maria in Trastevere and San Lorenzo in Rome, San Miniato in Florence, and many others in Central and Southern Italy, was modified so decidedly in most schools as to take the structure out of the class of basilical churches.



BASILICA OF SAINT CLEMENT'S, ROME (RESTORATION).

BASILICA (Gk. neut. plur. of βασιλικός, *basilikos*, royal). A legal code published by Leo VI. of the Byzantine Empire at the close of the Ninth or the beginning of the Tenth Century. Its name is equivalent, in the opinion of some, to Imperial law; but others think it was given in honor of Basil, the father of Leo, who began the work. It was composed of 60 books. The materials used were Greek translations of the *Corpus Juris Civilis* of Justinian, commentaries on the *Corpus*, and some later laws. In it the influence of Christianity is very marked, especially with regard to family relations. The best edition is Heimbach: *Basilicorum Libri LX. Gr. et Lat.*, 5 vols. (Leipzig, 1833-50), completed by Zachariæ von Lingenthal, who published the *Prolegomena* in 1846, and a supplement in 1870. But only about two-thirds of the whole work are extant. Consult: Heimbach, "Griechisch-römisches Recht," in Ersch und Gruber, *Encyklopädie*, Part LXXXVI. (Leipzig, 1818-80); Haubold, *Manuale Basilicorum* (Leipzig, 1819), a collation of Justinian with the later law; and Montreuil, *Histoire du droit byzantin*, 3 vols. (Paris, 1843-47).

BASILICA ÆMIL'IA. The finest basilica of Rome, built by L. Æmilius Paulus in B.C. 54 at a cost of $2,400,000 for the purpose of enlarging the Forum. It stood on the east side of the Forum near the Curia, or Senate-House. After a fire, it was restored in B.C. 17, and adorned with splendid columns of Phrygian marble, which were later set up in Saint Paul Without the Walls, and destroyed by fire in 1823.

BASILĬCA JU′LIA. A great basilica on the south side of the Roman Forum, founded by Julius Cæsar, and opened after the battle of Thapsus in B.C. 46. It was several times destroyed by fire and rebuilt. Its walls were of solid marble, and the pilasters which divided its nave and four aisles were of travertine sheathed with marble. The eastern end is crossed by the Cloaca Maxima. In the Basilica Julia the sessions of the Court of the Centumviri were held. In the Sixth Century, the northern vestibule was made into the Church of Santa Maria de Foro; in the Eleventh, rope-makers took possession of it; and, in the Fifteenth Century, it was given over to lime-burners, who set up in it their kilns, and turned its marbles into lime. Later, it was used as a hospital burying-ground, which covered its surface with a layer of human bones 6 to 8 feet deep. The basilica, like other buildings, has from time to time been despoiled of its materials, which have been used in the construction of other edifices, and the remains at the present time represent chiefly modern restorations.

BASILICA OF CON′STANTINE. See Constantine, Basilica of.

BASILICA PORCIA, pôr′shĭ-ȧ. The earliest Roman basilica, built in B.C. 184 by the elder Cato. It adjoined the Curia, and with the latter was burned by the followers of Clodius in B.C. 52.

BASILICA UL′PIA. A basilica built by Trajan as part of his forum. It measured 67 yards in width, and was surrounded by 96 columns, many of which were found when the basilica was excavated in 1813. The pavement was incrusted with valuable marbles, the roof of the nave was of bronze, as was the frieze, which was richly decorated and inscribed with the names of victorious legions. At the ends of the basilica were hemicycles, a part of which is still visible.

BASIL′ICON (Lat., from Gk. *βασιλικόν*, *basilikon*, a black plaster, properly neut. of *βασιλικός*, *basilikos*, royal, i.e. of great virtue). A name given to an ointment composed of yellow wax, black pitch, resin, and olive-oil. The ointment has also been called *unguentum tetrapharmacum* (from the Gk. *τέτταρα φάρμακα*, *tettara pharmaka*, i.e. four drugs). Basilicon ointment, or resin cerate, as it is sometimes called, is used as a gently stimulant application to ulcers, burns, scalds, chilblains, and boils.

BASIL′ICON DO′RON (Gk. *βασιλικὸν δῶρον*, *basilikon dōron*, royal gift). The title of a treatise written by James VI. of Scotland (afterwards James I. of England) for the instruction of his son, Prince Henry. It was first printed in 1599. The work is divided into three books, which treat severally of a king's duty toward God, his duty in his office, and his duty in indifferent things. In the first book is laid down the divine right of kings.

BASILIDES, băs′ĭ-lī′dez (Gk. Βασιλείδης, *Basileidēs*). A famous Gnostic Christian of Alexandria, who flourished during the reign of Hadrian (A.D. 117-138). Few details of his life are known. We are told, on doubtful authority, that he was a pupil of the heretical Menander at Antioch, and that he taught in Persia, where his dualistic system was later revived by Mani (see Manichæism). Basilides himself claimed to be a follower of one Glaucias, 'the interpreter of Peter,' but no such person is known to us from any other source. The otherwise unknown prophecies of Barcabbas and Barcoph, to which Basilides refers, have been conjectured to be apocryphal Zoroastrian books. Basilides wrote a Gospel commentary, called the *Exegetica*, in 24 books. Origen speaks of a "Gospel according to Basilides," but it is improbable that Basilides did more than edit some kind of a gospel for the use of his followers. He shows some acquaintance with material included in our Matthew, Luke, and John. His son Isidore wrote several books, three of which are mentioned by Clement of Alexandria, and from others of the Basilidian School there come various incantations and odes. None of these writings are known to us except through opponents of the movement. Agrippa Castor was one of the first to attack Basilides, but his book has perished. Irenæus, Clement of Alexandria, Hippolytus, and Origen discuss Basilides's doctrine at some length, but they do not agree in their accounts of what he taught. Following their divergent opinions, some modern scholars hold that Basilides constructed his system on Greek models, especially Aristotle; others, that he drew from the Orient, especially from the Persian dualism of Zoroaster. Criticism inclines at present toward the latter view.

Basilides's teaching should be studied in comparison with that of other Gnostics. (See Gnosticism.) He taught an elaborate cosmology, a system less perhaps like emanation than like evolution from the great Original. The cosmic process extended through a complicated series of heavens to the creation of our universe, and included redemption as its chief Christian feature. This redemption is not so much from sin as from cosmic disorders of all kinds, occasioned by Darkness invading the domain of Light. In the ensuing conflict, Light (Good) finally conquers. Basilides's system was not acceptable to the Church at large, and was pronounced heretical. His followers, however, were quite numerous, and we hear of them as late as the Fourth Century, although they never attained any importance outside of Egypt. It is doubtful whether we should connect the later Priscillianists of Spain with the Basilidians. An illustration of how widely the Basilidians departed from the principles of their founder may be drawn from the fact that some of them practiced a gross licentiousness, while Basilides was inclined toward asceticism.

The 'Abraxas gems,' many of which have been brought to light, are wrongly supposed by some to be of Gnostic origin, because of the occurrence of the word 'Abraxas' (*Abrasax* is the correct form) in Basilides's system, where it is the collective designation of the heavenly or spiritual beings, whose number is 365 (represented in Greek by the letters of the word *abrasax*). These charms and amulets probably have nothing to do with Gnosticism. See Abraxas.

Bibliography. Uhlhorn, *Das basilidianische System* (Göttingen, 1855); Mansel, *Gnostic Here-*

sies, ed. Lightfoot (London, 1875); Hort, "Basilides," in Smith and Wace, *Dictionary of Christian Biography* (London, 1887); Schaff, *History of the Christian Church*, II., 466-472 (New York, 1891). See further, under GNOSTICISM.

BASILIO DA GAMA, bȧ-sē'lē-ō dȧ gä'mȧ, JOSÉ. See GAMA, JOSÉ BASILIO DA.

BAS'ILIS'CUS (Gk. Βασιλίσκος, *Basiliskos*). Emperor of the East from 476 to 477. He was brother-in-law of the Emperor Leo I. In 468 he had led the great African expedition against Genseric, the Vandal, which ended disastrously. His reign was uneventful. He was deposed by Zeno in 477, and died the following year.

BASILISK, băz'ĭ-lĭsk (Gk. *βασιλίσκος*, *basiliskos*, dimin. of *βασιλεύς*, *basileus*, king, same as Lat. *regulus*, little king. So named, according to Isidor, because it was the king of serpents, but perhaps by reason of the crest on its head). A fabulous creature, resembling a serpent, and supposed by the ancients to inhabit the Libyan Desert. It was described as being of a yellowish color, with spots of white, and as having a pointed head, whereon stood one or more prominences, also white, resembling a diadem. Its breath was considered to be especially poisonous, and its glance fatal. The word *basilisk* is now applied to a sort of lizard, having an erectile crest along the middle of the back and tail, and a dilatable pouch on the head.

BASIL'IUS VAL'ENTI'NUS. See VALENTINUS, BASILIUS.

BA'SIN (OF. *bacin*, from LLat. *bachinus*, from *bacca*, water-vessel). In geology and hydrography, a depression of the earth's surface, or of the strata constituting the crust of the earth, also the drainage area of a river system. Basins originate in several ways, and may be grouped under two general heads: those formed by crustal movements and those due to erosion. Most basins are due in part to both agencies. Basins formed by movements of the earth's crust are apt to be of great extent according as they owe their origin to either localized or continental movements. The Mississippi Valley, previous to Tertiary time, was occupied by a shallow arm of the sea that covered the central portion of the North American continent. Elevation of the continent raised the district above sea-level and drained the marine waters from the land, and orogenic movements partially surrounded it with mountains, with the result that an extensive interior basin was formed, the larger part of which is now drained by a single river system, that of the Mississippi. Other portions of the same basin are drained by the Saint Lawrence River and by the rivers that flow into the Arctic Ocean. We have here an example of a geologic basin that contains several hydrographic basins.

The inclosed basins of Utah, Nevada, Arizona, and Mexico have been formed by local movements, folding, and faulting of the crust, that have culminated in the elevation of mountains inclosing plains. The elevation of the mountains has cut these plains off from the supply of moisture-laden winds, and arid desert conditions have largely ensued. During a former more humid period in Pliocene time great lakes occupied many of these basins, but their waters have disappeared largely through evaporation and lack of supply by rains, and concentrates of alkali, salt, and gypsum now cover large areas of their desert bottoms, while traces of their former shore lines are to be found far up on the mountain sides. See LAKE BONNEVILLE; LAKE LAHONTAN; GREAT SALT LAKE.

Another form of basin results when a section of the earth's crust subsides between two nearly parallel great faults or dislocations, to form what is known as a 'rift valley' (q. v.). The most striking basins of this kind are found in Western Asia and Eastern Africa. The largest basin in this region begins north of the Dead Sea, and extends southward through the valleys of the Dead Sea, the river Jordan, and the Red Sea, whence the rift is continued in a southerly direction across Eritrea in Africa, to a point near Mount Kilimanjaro. This may be considered a continuous single depression or rift-valley basin, with a length of about 3500 miles and a maximum width at the Red Sea of 200 miles. Another such depression extends westward of the Victoria Nyanza for nearly 1500 miles in a general southerly direction, and includes the valleys of the Albert Nyanza, Tanganyika, and Nyassa, terminating at the coast in the vicinity of the mouth of the Zambezi River. The amount of displacement of the bed of this latter rift has been enormous, the vertical throw of the faults having been at least 5000 feet in the vicinity of Lake Tanganyika. In volcanic regions basins filled by lakes often occur in the craters of extinct volcanoes. Crater Lake, in Oregon, is a good example.

In coal-mining regions the term basin is applied to synclinal depressions of the coal-bearing strata that have been produced by the folding of the beds incident to their elevation into mountains. Such a stratigraphic basin in the crust of the earth is not usually co-extensive with a hydrographic basin on the surface, for the reason that synclinal depressions generally occupy ridges. The anticlinal upfolds have been worn away by weathering, and are now replaced by valleys or hydrographic basins.

Basins formed by erosion are of two kinds, those formed by the work of rivers and those due to the wearing action of glacier ice. The former are the larger and more common, though the latter often constitute prominent features of the landscape of northern countries. The basin of a river, when considered hydrographically, consists of the entire area drained by the main stream and its tributaries. This hydrographic basin may be in large part the result of orogenic movements; but its present boundaries have been determined entirely by the cutting power of its streams, and accordingly a hydrographic basin may consist of one or more geologic basins. The Hudson River system furnishes a good example of such a complex basin. The Lower Hudson River, from New York City to Peekskill; the Upper Hudson, from Peekskill to the Adirondacks; the Schroon River in the Adirondacks; the Mohawk River; the Schoharie, Esopus, and Catskill creeks, in the Catskill Mountains; and the Rondout in the Shawangunk Mountains all drain distinct geological basins, the divides between which have been cut down by the rivers, till now the entire region is included in a single hydrographic system.

Glacial basins have been formed by the eroding power of ice acting on the floor and sides of valleys already formed by some other means.

The basins usually hold lakes that form parts of river basins. Such are the 'finger lakes' of central New York. Round lakes occupying shallow, bowl-shaped depressions on glaciated surfaces are common. A basin may also be formed when a landslide or moraine obstructs a valley. Such a basin and its contained lake is of an evanescent character, the extent of its duration depending upon the rate at which the overflow can cut down or remove the obstruction.

Basins tend in time to become shallower through the accumulation upon their floors of débris worn from the surrounding mountains. This process would, if continued without interruption, eventually fill the basin to its brim with deposits of gravel, sand, and silt, and a plain would result which, under conditions of sufficient moisture, would be of great fertility. Such waste-filled basins are common in the Pacific States. The discussion of the origin and characteristics of oceanic basins is reserved for the article on Ocean. See also articles on Rift Valley; Lake; River; Hydrography; Physiography.

BASIN. A wet dock, with or without gates, in which vessels may be kept afloat at all stages of the tide. See Docks.

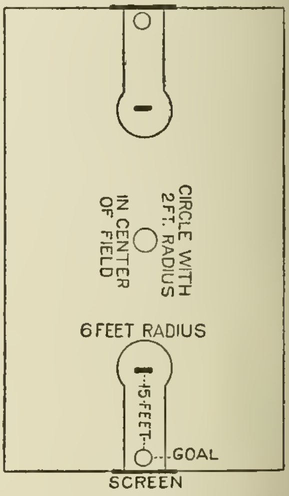
BASING (bā′zĭng) **HOUSE.** Once the seat of the Marquis of Winchester, in Hampshire, England, and the last stronghold of the Royalists. It fell before Cromwell in 1645. Basing is the scene of the Danish victory over Ethelred and Alfred in 871.

BASINGSTOKE, bā′zĭng-stŏk (stock or place belonging to the Basings). A market-town and railway junction in Hampshire, England, 45 miles southwest of London, at the junction of five main roads from the south and west of England to the metropolis, and on the Basingstoke Canal, which connects it with the rivers Wey and Thames (Map: England, E 5). The town received its first charter from James I. It has a handsome parish church, town-hall, municipal corn exchange, and owns remunerative real estate, water-works, markets, and cemetery. The chief trade is in corn, malt, coal, and timber, and it has manufactures of agricultural implements, etc. In the neighborhood are the ruins of Basing House, belonging to the Marquis of Winchester, which withstood the forces of the Commonwealth for four years, but was at last taken by Cromwell, and burned to the ground in 1645. Population, in 1891, 8200; in 1901, 9800.

BAS′KERVILLE, John (1706-75). A noted English printer, born at Wolverley, Worcestershire. Originally a footman, he afterwards became successively a stone-cutter and a writing-master, and from 1740 manufactured japanned ware with much success at Birmingham. There, in 1750, he began costly experiments in type-founding, and having obtained a satisfactory letter, published in 1757 his quarto *Vergil*, ranked by Dibdin (*Introduction to the Knowledge of Editions of the Greek and Latin Classics*, 1827) among the 'most finished specimens of typography.' In 1758 he was appointed for ten years printer to the University of Cambridge, in which capacity he executed (1763) his famous edition of the Bible. From 1770 to 1773 he imprinted the splendid series of Latin classics. His type, not unqualifiedly praised by contemporaries, is now much admired. He manufactured his paper, and devised a method of preparing a rich and uniform ink. Specimens of his work are now very scarce and valuable. Among his friends was Benjamin Franklin, with whom he corresponded regarding the sale of type-founding and printing establishments to the French Government.

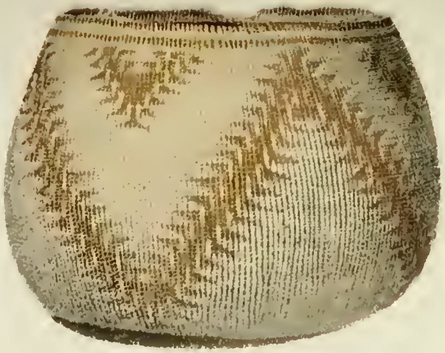
BAS′KET (Lat. *bascauda*, an article of furniture, made of basket-work; probably of Celtic origin; cf. Welsh *basged, basgawd*). A vessel made of willow, thin strips of wood, reeds, grasses, or similar flexible materials woven together in a great variety of forms, and used for many different purposes. Baskets have been in use from very early ages, and were constructed by the most primitive peoples in one form or another. The ancient Britons are said to have been highly skilled in making baskets, and to-day many tribes of American Indians, the Chinese, and others show great artistic skill and workmanship in the making and ornamentation of baskets. For the ordinary commercial utensils of this kind, the materials most extensively employed are thin split strips of ash and oak, willow, and rattan. The tools required for basket-making are simple, the bulk of the work being done by hand.

BASKET BALL. A game that may be played on any ground or floor on which an oblong space not exceeding 3500 square feet can be marked. The goals, at each end of the floor or field, are hammock nets of cord, suspended from metal rings 18 inches in diameter at a height of 10 feet. The ball is a round, inflated bladder, covered with leather, from 30 to 32 inches in circumference, and weighing from 18 to 20 ounces. The game is played in halves of 20 minutes, between teams of 5 players each (a left and a right guard, a centre, and a left and a right forward). The ball is put in play by being thrown by the referee into the centre of the field at right angles from the side lines and to a greater height than either of the centres can jump, whereupon each team endeavors to throw the ball into the basket of the other, and to prevent its opponents from making a similar goal. The ball must be thrown or batted with the hands. It may not be kicked, punched, or carried. A player may not tackle, hold, push, shoulder, kick, or hack an opponent, and intentional roughness will disqualify. The penalty for these and other offenses gives the opposing team a free throw for the basket from a distance of not less than 15 feet. A goal so made counts one point; an ordinary goal from the field, three points.



The game is regulated by the Amateur Athletic Union, which has drawn up the official rules for

INDIAN BASKETS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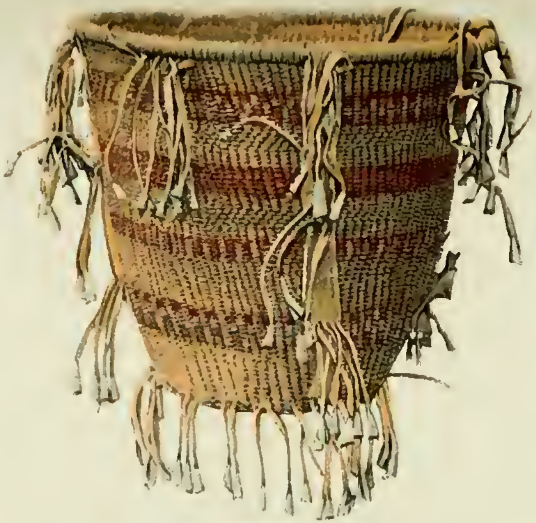
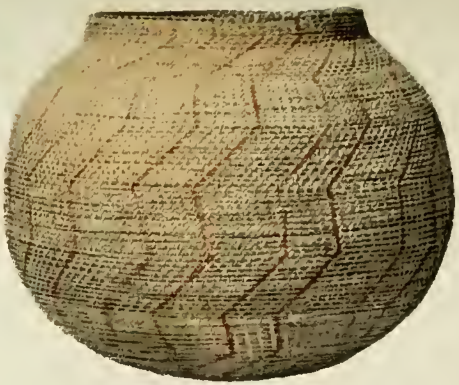

APACHE, ARIZONA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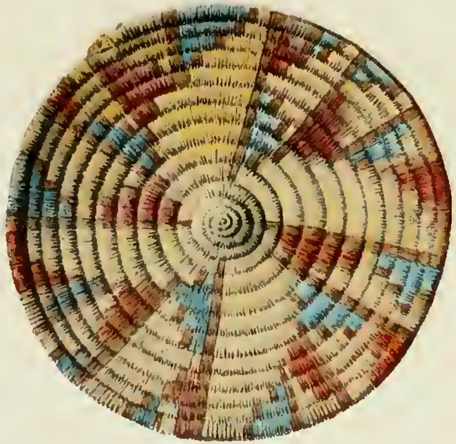
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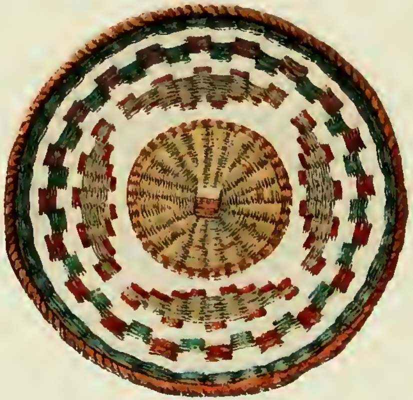
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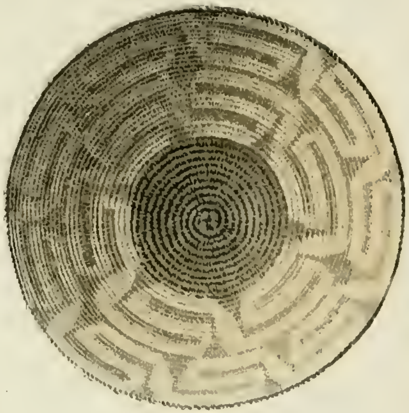
MARICOPA, ARIZONA

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its practice. It enjoys the unique distinction of having been invented by a single brain at one sitting. In 1891 a lecturer on psychology in the training-school of the Young Men's Christian Association at Plainfield, Mass., speaking of the mental processes of invention, proposed the example of a game with its limitations and necessities. The same night, James Naismith, a member of the class, worked out basket ball as an ideal game to meet the hypothetical case; and the next day in the lecture-room it was put in practice with the aid of the members of the gymnastic class. Thence it spread to other branches of the Young Men's Christian Association, and in two or three years to other athletic clubs and to the general public.

BAS′KET-FISH′. A group of echinoderms of the same class (*Ophiuroida*) as brittle-stars, but of the genus Astrophyton, characterized by dichotomously branched arms, in some species so numerously subdivided that when they are curled up the creature seems inclosed in a basket. The five-sided disk varies in size with age and species, but may be 3 inches broad, while the arms may be 10 to 15 inches in length. The upper side of the disk has ten radial ribs, bearing short, blunt spines. The animal is wholly covered with an epidermis, granulated above, but smooth beneath, except that it seems to have a double line of stitches under each arm. The general color is light buff; but the interbrachial spaces in the living animal vary from dark purple to bright pink. The mouth is on the under side and central, and is set with spiniform bristles hiding numerous thorn-like teeth. From around the star-shaped mouth branch 5 stout arms, each of which is divided at the edge of the disk. Each of these 5 main branches is divided into 2, making 10; each of the 10 is divided, making 20—and so indefinitely down to the least visible filament. An English naturalist counted 81,920 of these 'small sprouts, twigs, or threads' in one species. On capture or disturbance the creature instantly folds its arms closely about its body, shrinking from the touch like a sensitive plant and assuming the basket-shape from which it gets its familiar name. The attempt to untwist these coils generally ends in breaking the delicate but tenacious threads. The basket-fish is probably a vegetable feeder, and its peculiar arms serve possibly for its protection from its enemies. The microscope shows each arm and spine to terminate in a minute but sharp hook. The animal, in moving, lifts itself on the extreme end of its long arms, standing as it were, on tiptoe, so that "the ramifications form a kind of trellis-work all around it reaching to the ground, while the disk forms the roof." A number of species of basket-fish are known; perhaps a dozen are valid. They are found in moderately deep water in most parts of the ocean, especially in the tropics, though the best-known species are of the North Atlantic.

BAS′KETWORM′. See Bagworm.

BASK′ING FISH, or **BASKING SHARK.** See Shark.

BASLE, bäl. See Basel.

BASNAGE DE BEAUVAL, bȧ′nȧzh′ de bô′vȧl′, Jacques (1653-1723). A French statesman and writer on theology; the most distinguished of a French family known as supporters of the Protestant cause. He was the son of Henry Basnage (1615-95), an able advocate in the Parliament of Normandy, and was born at Rouen, August 8, 1653. Having studied theology at Geneva and Sedan, he became pastor of the Reformed Church in Rouen (1676). That church being interdicted in 1685, Basnage obtained leave to retire to Holland, where he finally (1709) settled as stipendiary minister of the Walloon Church in The Hague, having gained the friendship of the Grand Pensionary, Heinsius. Here, while zealously discharging his religious duties, he was called upon to take an active part in State affairs, particularly in negotiating the defensive alliance concluded between France, England, and the States-General, February 14, 1717. Amid all these duties and distractions, Basnage cultivated literature with ardor, and was no less distinguished for his extensive learning than for the polish of his manners and the integrity of his character. He died at The Hague, December 22, 1723.

His chief works, which have been frequently laid under contribution without being named, are *La communion sainte* (1688), a work approved even by Roman Catholics, and often reprinted; *Traité de la conscience* (1696, 2 vols.); *Histoire de l'Eglise* (1699, 2 vols. fol.), in four parts, of which the fourth reprints his *Histoire de la religion des églises réformées* (Rotterdam, 1690, 2 vols.; 3d ed., 1725). It was a Protestant reply to Bossuet's *Variations of Protestantism*, to show that Protestantism is the true successor of the Apostolic Church; *Histoire des Juifs* (1706, 5 vols.), one of Basnage's best productions, and translated into English by Th. Taylor (1708); *Dissertation historique sur les duels et les ordres de chevalerie* (1720). For biography, consult his *Life*, by E. A. Mailhet (Geneva, 1881).

BA-SONGE, bä′sōn′gȃ. Negroes of the Kassai-Sankuru Basin, Congo Free State; noted for their pottery, weaving, and iron and copper work. Their towns are of great extent. The men are tall and of splendid physique.

BASQUE (Fr. *Biscayan*, Lat. *Vascones*, whence Fr. *Gascons*, Med. Lat. *Biscaini*, *Busci*, Basque *Euskaldun* or *Eskalkun*). An isolated language of Southern France and Northern Spain, of entirely unknown affinities, spoken by about 440,000 persons. It is most plausibly supposed to be the sole representative of the ancient Iberian languages, which were superseded by Latin when the Romans conquered Spain and Gaul. In structure, Basque belongs to the so-called polysynthetic or agglutinative type of languages, since it incorporates into the verb the pronominal elements for subject and object. In this respect it bears a marked resemblance to certain dialects of the Caucasian group, and even to some North American Indian languages. All attempts to trace a real connection, however, between Caucasian and Basque have thus far proved unsuccessful, while parallels between Basque and American Indian are probably to be regarded merely as accidental coincidences. The late Georg von der Gabelentz sought to trace an affinity between Basque and the Berber dialects, but this theory also is open to grave doubts. It seems safest, in the present stage of linguistic knowledge, to regard this language as forming a family by itself.

Basque is divided into several dialects, of which the chief are those of Guipúzcoa, Biscay, Labourdin, and Lower Navarre, all of which adopt the Roman alphabet, conforming their orthography to either the Spanish or the French, according to their position south or north of the Pyrenees. Basque words are accented, as a rule, on the final syllable, which ends in a vowel, or in *s*, *r*, *l*, *n*, and once in *t*. It possesses nouns, adjectives (which have no radical affinity with the nouns), pronouns, and verbs. Grammatical gender is lacking, while the verb, like the Germanic, has, properly speaking, but two tenses, present and past. The noun has two numbers and seven cases, nominative - accusative, instrumental, genitive, dative, locative, sociative (*gison-are-kin*, with the man), and caritive (*gison-a-gabe*, without the man). The article, originally, as in Indo-Germanic, a demonstrative, stands between the noun-stem and the flectional ending (*gison-a*, the man; genitive, *gison-ar-en;* dative, *gison-ar-i*). Similarly, the adjective, which follows the noun, alone receives inflection (*ur garbi*, pure water; genitive, *ur garbi-ar-en*). The Basque verb is either transitive, in which case the object can never be omitted, or intransitive, and both classes are strong or weak, according to the absence or presence of the auxiliary verb. In the intransitive verb the subject precedes, while the order of the transitive is object, verb, subject (*h-a-bil*, thou goest; but *h-a-kar-t*, thee bear I). The substantial agent of a transitive verb is denoted by the instrumental (*gison-a-k yan du*, the man has eaten it; literally, by the man was its eating), forming a curious partial analogy to the usage in many modern Indo-Iranian languages, as well as in the Australian dialect of Encounter Bay. In addition to the indicative mood, the verb has an optative and an imperative. The rather meagre tense-system of the Basque is supplemented by a future and a future perfect, nearer and remoter perfect, as well as pluperfect by analogical influence from the Romance languages, as *ibiliko n-ais*, which is almost exactly equivalent to the English *I have to be a-going*, or the French *irai*, I have to go, from Latin *ire habeo*. The numerical system, as in the Central American languages, is primarily vigesimal. Basque literature is not extensive, and is mostly of a popular character, poems, quasi-dramatic compositions somewhat resembling the mystery-plays of the Middle Ages, and the like, together with translations of religious literature. Although it has adopted numerous loan-words from French and Spanish, it has maintained its own remarkably against its Romance neighbors.

Consult: Müller, *Grundriss der Sprachwissenschaft*, Vol. III. (Vienna, 1887), where an excellent summary of Basque grammar is given; Gerland, "Die Basken und die Iberer," in Gröber, *Grundriss der romanischen Philologie*, Vol. I. (Strassburg, 1892-98); Mahn, *Denkmäler der baskischen Sprache, mit einer Einleitung über das Studium derselben* (Berlin, 1857); de Azene, *Euskal Izkendea: Gramática éuskara formada y traducida* (Bilbao, 1891), Basque and Spanish; Van Eys, *Dictionnaire basque-français* (Paris, 1873); Van Eys, *Grammaire comparée des dialectes basques* (Paris, 1879); Van Eys, *Outlines of Basque Grammar* (London, 1883); Vinson, *Essai sur la langue basque par François Ribáry, traduit du hongrois* (Paris, 1877); *Essai d'une bibliographie de la langue basque* (Paris, 1891); Campion, *Gramática de los cuatro dialectes de la lengua euskara* (Toulouse, 1884); Aizquibel, *Diccionario basco-español* (Toulouse, 1882-85); Larramendi, *Diccionario trilingue del Castellano, Bascuence y Latin* (2 vols., San Sebastian, 1853); Michel, *Le pays basque, sa population, sa langue, ses mœurs, sa littérature et sa musique* (Paris, 1857); Linschmann and Schuchardt, *Leiçarraga's Baskische Bücher von 1571, Neues Testament, Kalender, und Abc, im genauen Abdurck* (Strassburg, 1900).

BASQUE PROVINCES. A district in the northern part of Spain, comprising the provinces of Vizcaya (Biscay), Guipúzcoa, Alava, and a portion of Navarre, which constituted the ancient Cantabria. The total area of the district is about 7000 square miles. The surface is very mountainous, particularly in the Province of Alava, which is everywhere cut up into deep, narrow valleys by offsets from the main chain of mountains. The rivers of Vizcaya and Guipúzcoa empty, after a short course, into the Bay of Biscay; those of Alava flow down the opposite slopes into the Ebro, which carries their waters to the Mediterranean. The climate is, on the whole, mild and salubrious. The general aspect of the country is very picturesque, the hills in most cases being covered to the summit with forests of oak, beech, and chestnut. The soil in the valleys and plains, while not very rich, has been rendered productive by the energy of the people, although agricultural methods in the heart of the Basque provinces are of the most primitive kind. The farms are small, usually only about four or five acres, and rarely more than can be managed by the farmer and his family. The products are barley, maize, flax, hemp, and some wheat. Iron is found in abundance; also copper and tin, marble, porphyry, and jasper. The fisheries on the coast are productive. The population of the district, including the entire Province of Navarre, was 879,644 in 1897. About one-half of this number, however, belong to the Basque race. Consult: Whiteway, "Customs of the Western Pyrenees," in *English Historical Review* (London, 1800); Fabié, *Estudio sobre la organización y costumbres del país vascongado* (Madrid, 1897).

BASQUE RACE. The Basque race is not confined to the Basque Provinces or to the southern side of the Pyrenees. On the French side of the Pyrenees three cantons of the Department of Basses Pyrénées, i.e. Labourd, Basse-Navarre, and Soule, are inhabited by Basques, who, though they retain their own tongue, have not so fully preserved the characteristics of the race as their Spanish brethren, but are, anthropologically, midway in skull measurement and other tests of racial affinities between the Auvergnats on their north and the Spanish Basques.

The Spanish Basques are a simple, brave, and independent people, willing to undergo any hardships rather than surrender their mountain freedom. No invader was ever able effectually to subdue or to expel them. The Basque Provinces retained, until 1876, a separate constitution guaranteeing them many political and fiscal privileges not possessed by the rest of Spain. (See FUERO.) But on the suppression of the Carlist insurrection, which had its stronghold in the Basque Provinces and in Navarre, the old immunities were abolished. The Basques are even prouder than the Spaniards, and the mere fact of being born in their territory secures the privilege of 'universal nobility.' *Escualdunac* is the name the Basques give themselves, a word which is usually taken to mean either 'eaters of acorns,' or 'dwellers in oak forests,' although many Basque scholars consider this meaning absurd, and say that it may be derived from a root meaning 'way of speaking.' Their country they call *Escualeria;* and their language, which is peculiarly their own, *Escuara,* the prefix *Escu* being, perhaps, 'the old *Osc, Vesc, Vasq* of Italy and Iberia.' The origin of the Basques is doubtful. The researches of Humboldt and Marrast have, however, established the fact that most of the early Iberian names are derived from the Basque, and that Basque was the language spoken by the primitive inhabitants of the entire peninsula of Spain, as well as by the Iberians.

On biological grounds the Basques are now placed with the Hamitic branch of the white races, Egyptians and Berbers. It is in this direction, not among the Finns and Esthonians, that their genealogy must be sought. The Basques are north African or European, not Asiatic. On this consult Collignon, *La race basque,* quoted by Keane in *Man: Past and Present* (Cambridge, 1899).

There are at present about half a million Basques in Spain and France, three-fourths of whom are in the Basque Provinces. It is said that in addition to these some 200,000 Basques emigrated during the last half of the Nineteenth Century to South America, to which they have contributed a most desirable element in the population ever since the beginning of Spanish America, on account of their great bodily strength, good habits, and industry. Many eminent Spaniards have come from the Basque Provinces, the most noted being Ignatius Loyola and Saint Francis Xavier. For a more particular account of the Basque race, consult: Vinson, *Les Basques et le pays basque* (Paris, 1882), an excellent summary; the same writer's *Essai d'une bibliographie de la langue basque* (Paris, 1891); Marrast's edition of Humboldt, *Recherche sur les inhabitants primitifs de l'Espagne* (Paris, 1866); Hübner, *Monumenta Linguæ Ibericæ* (Berlin, 1893); Michel, *Le pays basque* (Paris, 1857); and Baudrimont, *Histoire des Basques* (Paris, 1867).

BASRA, BUSRA, or **BASSORA** (Pers. and Arab. *Basrah,* fortress). A town of Asiatic Turkey, the capital of the easternmost vilayet of the same name (area 16,482 square miles; population, 200,000), on the Ashar or Basra Creek, about 3 miles from its confluence with the Shat-el-Arab, 60 miles from the Persian Gulf (Map: Turkey in Asia, M 7). Situated at the head of navigation, Basra is a place of great commercial importance, and has regular steamer communication with Europe and Indian ports. The chief imports from India are coffee, indigo, rice, wood, and drugs; and from Europe, and especially Great Britain, manufactured articles. The surrounding country is very fertile, and yields vast quantities of fruit; dates are exported to the amount of 60,000 tons annually. In 1900 the value of imports was $6,220,274, of exports $6,806,370. The town is surrounded by a wall in imperfect repair; its most notable buildings are two fine mosques, and the tomb of Zobeir. It is a military station, with a dockyard and a factory, and is the seat of a British consulate and of a United States consular agency. The consulates and mercantile establishments line the river bank in the Margil suburb. The climate is malarious and unhealthful, and the water-supply bad. The population of Basra, which in the Eighteenth Century was estimated at 151,000, is now about 40,000, and consists chiefly of Arabs, a few Europeans and Indians, and some 3000 Persian merchants and employés, 1000 Jews, and 400 Armenians.

BAS-RELIEF, bä'rē-lēf' (Fr., low relief). See ALTO-RILIEVO and RELIEF SCULPTURE.

BASS, bās, or **BASE** (Fr. *bas,* fem. *basse,* It. *basso,* low, from LLat. *bassus,* low, short). The deepest or lowest part in a musical composition, and the deepest or lowest tone in a chord. It is next to the upper part in the independence and originality of the melodic design, and in respect to harmony it is the most important part, containing more frequently the fundamental notes of the chords; on it, moreover, is formed the effective musical figure known as organ-point (q.v.). *Bass* or *basso.*—The lowest male voice, generally with a compass of F to d^1, all in the chest register (q.v.). *Bass.*—The name of an old bow instrument with five or six strings.

BASS, băs (originally *barse,* AS. *baers,* the perch). The name of many fishes, chiefly and most correctly applied to those of the perciform families Serranidæ and Centrarchidæ. The former family include the *Salt-water Bass,* represented typically in Europe by the sea-perch (*Morone labrax,* formerly called *Labrax lupus*), to which the old English name 'basse' was first applied. This is common in the Mediterranean and in British and Dutch waters, swimming in shoals and entering estuaries and streams to spawn. It may reach 2½ feet in length, and is highly esteemed as food. The nearly related American striped bass, or rockfish, *Morone lineata* (see colored plate accompanying article TROUT), often reaches a weight of 30 to 90 pounds, is distributed along the entire east coast of the United States, ascending at times 30 to 50 miles above the tide-water line, is very abundant, and enters rivers in the spring to spawn. It is one of the most important American food-fishes, and has been introduced by the United States Fish Commission to the Pacific Coast, where it has now become numerous and valuable. Angling for this fish is one of the foremost sports along the eastern coast as far north as the Bay of Fundy, where they congregate in great numbers. Various methods are employed, as trolling, in Chesapeake Bay, etc.; but the customary method is to cast in the surf with a rod and reel, the former like a salmon-rod, and the reel capable of holding 200 to 300 yards of line. The season is July, August, and September, when the fish approach close to the shore, schooling in the surf, and entering bays and rivers. Hence such rocky shores as those from New York City to Cape Cod are favorable; and the finest of sport is enjoyed from out-reaching rocks at the entrance of Buzzards and Narragansett bays, where expensive stagings are often erected for convenience. Living bait of great variety is used, and very long and skillful casting is required, success being rewarded by an exciting tussle with this strong and spirited fish, calling for the highest skill. In the upper waters of the tidal rivers, when found resting below the rapids, it will take a gaudy fly very greedily, and give fine sport.

The yellow bass (*Morone interrupta*) of the Lower Mississippi Valley, the white perch (*Morone Americana*) of the Atlantic Coast (but also sometimes landlocked), and the white bass, or white perch (*Morone chrysops*), of the Great Lakes and Mississippi Valley, are all excellent food fishes, and are true bass. Other marine fishes are sometimes styled bass, as the weakfish and various relatives, which are 'sea bass,' one (*Cynoscion nobilis*) being the 'white sea-bass' of the Californian markets. In the Southern States the drum (Pogonias) is so known.

The *Fresh-water Bass* belong to the sunfish family, Centrarchidæ, and are prominently represented by the two black bass of sportsmen—the small-mouthed (*Micropterus dolomieu*) and the large-mouthed (*Micropterus salmoides*). In waters east of the Alleghanies they are imported fish, getting into the Hudson through the Erie Canal as early as 1825. They were first planted in the waters of eastern New York and the other Middle States nearly fifty years ago, a small quantity having been brought in 1853 from the Youghiogheny River and planted in the Baltimore and Ohio Canal, whence they found their way into the Potomac, Susquehanna, Delaware, and other rivers. The small-mouthed bass prefers clear, running streams, but the large-mouthed prefers quiet waters. The latter grows to a larger size, an extreme weight being 20 pounds, a not uncommon weight 6 to 10 pounds. Both are variable in color and highly esteemed for food, and both are among the best, if not the *very* best, game-fish of the United States.

The fishing varies as to time and apparatus. In the Great Lakes, at certain haunts, like the Bass Islands, in Lake Erie, catches are made only in spring and fall, when the fish are leaving or returning to their winter haunts. Trolling with a rod is a favorite method in lakes and ponds. The most artistic and enjoyable way is to cast with rod and reel, using either a live minnow or a fly. Special tackle has been developed for this purpose, the fly-rod being as light and comely as that for trout, though somewhat heavier tackle must be used on lakes than along streams, where a 7½-ounce rod 10 feet long suffices, with a fine line, very strong leaders, and hooks less than No. 2. The flies used are larger than those for trout, brown, red, and black 'hackles' being recommended for general use. A shorter and, by a trifle, heavier rod is used for minnow-casting. The time for bass-fishing in the Gulf States is in autumn and winter; in the Northern and Central States in May and June, or in September and October. This is with reference to their peculiar habits of midsummer spawning in nests.

Other species in this family are the rock-bass or red-eye (*Ambloplites rupestris*) and the calico or grass bass (*Pomoxis sparoides*), both good food fishes, and much used in the Mississippi Valley. See Plate of Fresh-water Bass.

BASS, bȧs, Edward (1726-1803). The first Protestant Episcopal bishop of Massachusetts, his native State. He graduated at Harvard in 1744, was ordained in England by Bishop Sherlock in 1752, and on his return became and remained through life rector of Saint Paul's, at Newburyport. In 1797 he was consecrated first Bishop of Massachusetts, his jurisdiction being afterwards extended over New Hampshire and Rhode Island. For his life, consult D. D. Addison (1897).

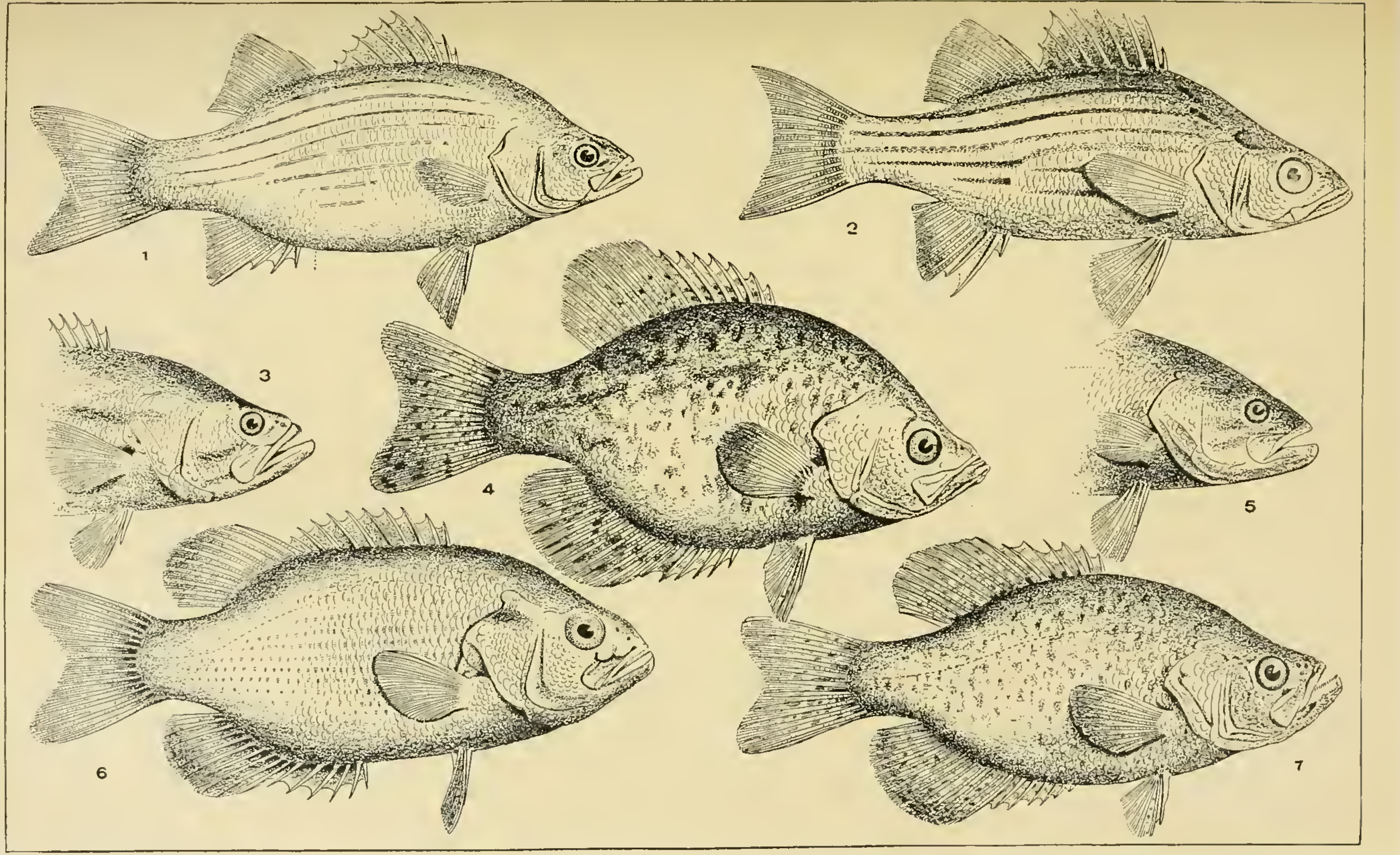
BASSANIO, bȧs-sä'nē-ō. Portia's lover in Shakespeare's *Merchant of Venice* (q.v.). He chose the leaden casket and won her for his wife.

BASSANO, bȧs-sä'nō (anciently *Bassanum*). A city in North Italy, on the Brenta River, and the Padua-Bassano Railway, 30 miles north of Padua (Map: Italy, F 2). It has a castle and high walls, and is picturesquely situated at the foot of the Alps. In the cathedral and the other churches, and in the museum, are paintings of J. Bassano; Canova's "Death of Socrates" is in the Villa Rezzonica. Bassano has potteries and tanneries, and a great printing establishment, and an active commerce in silk, cloth, leather, oil, wine, and asparagus. In 1796 Bonaparte defeated the Austrians under Wurmser here. Population, 6100.

BASSANO. The name applied to a family of Italian artists, from their residence, a town near Vicenza; their real name was da Ponte.—Francesco, founder of the family, was probably a pupil of Bartolommeo Montagna at Vicenza. The most prominent member of the family was his son and pupil Jacopo (Giacomo) da Ponte (1510-92), who was, however, more influenced by his study of the works of Titian at Venice. After practicing in the manner of Titian and Bonifazio, he returned to Bassano, where he formed an individual style, suggested by his rustic environment, and became the founder of genre painting, properly so called, in Italy and Europe. His subjects are for the most part landscapes with people and the accessories of the peasantry, or else pastoral scenes from the Old Testament in which the sacred personages appear as peasants. He was also celebrated as a portrait-painter. The most striking technical features of his painting are the bold play of light and the gem-like effect of his coloring. Two of his best works from scriptural subjects are in his native town; the museums of Vienna, Dresden, and Paris are particularly rich in examples of him.—He was assisted by his four sons, of whom the most important were Francesco (1545-97) and Leandro (1558-1623). Francesco's best-known work is a painting on the ceiling of the Ducal Palace, Venice, "The Capture of Pavia by Night." Consult Berenson, *Venetian Painters* (New York, 1894).

BASSANO, Hugues Bernard Maret, Duke of (1763-1839). A French statesman. At the beginning of the Revolution he was editor of the *Bulletin* (the original of the *Moniteur*), containing the proceedings of the Constituent Assembly, a position which gave him much political influence. At first inclining to the Jacobins, he subsequently favored a constitutional monarchy. In 1792 he became chief of a bureau in the Ministry of Foreign Affairs, and after August 10, 1792, was employed in various diplomatic missions—as envoy to England, to Naples (1793), and to England again (1797). He coöperated with Napoleon in the *coup* of the 18th Brumaire (1799). He became Napoleon's confidential adviser, and later his Secretary of State for Foreign Affairs. During the Hundred Days, Napoleon made him Duke of Bassano. He was in exile during the Restora-

AMERICAN FRESH-WATER BASS



1. WHITE BASS (Roccus chrysops).
2. YELLOW BASS (Morone interrupta).
3. BIG-MOUTHED BLACK BASS.
4. CALICO BASS (Pomoxis sparoides).
5. SMALL-MOUTHED BLACK BASS.
6. ROCK BASS (Ambloplites rupestris).
7. CRAPPIE (Pomoxis annularis).

tion; but Louis Philippe restored him to the peerage in 1831, and made him the head of a short-lived ministry.

BAS′SARIS, or **BASARISK.** The Cacomistle (q.v.).

BASS (bās) **DRUM.** A musical instrument of percussion. It has a cylindrical body of wood, over both ends of which a membrane is stretched tightly by means of hoops. The bass drum is played by beating either one or both heads with sticks having soft, padded knobs at their ends. See Drum.

BASSEIN, băs-sān′ (Hind. *Wassim*). A town in the Presidency of Bombay, India, situated on an island of the same name, 28 miles north of the city of Bombay; latitude of island, 19° 20′ to 19° 28′ N. In 1720 it had over 60,000 inhabitants; but through war, plague, and other causes has decayed until its population had dwindled to 11,000 in 1901. In 1534 it was ceded to the Portuguese; in 1765, after a possession of 231 years, it was wrested from them by the Mahrattas; in 1780 it surrendered to the British after a siege of 12 days. The island contains about 35 square miles; it is separated from the continent by a narrow channel, which, as a shelter for shipping, constituted its value in the eyes of the Portuguese. Bassein is of historical interest, having been promised, though never delivered, as part of the dowry of Charles II.'s Portuguese consort.

BASSEIN, or **BASSIM.** The capital of the district of Bassein in Lower Burma, on the left bank of a mouth of the Irrawaddy, 90 miles from the sea (Map: Burma, B 3). It has a considerable trade in rice. The United States is represented by a consular agent. The place is of military importance, as it commands the navigation of the stream. It was captured by the British in 1852. Population of town, 30,000; area of district, 4127 square miles; population, in 1891, 311,260; in 1901, 383,100.

BASSELIN, bȧs′lăɴ′, or **BACHELIN,** Olivier (c.1350-c.1419). A French poet, born in the Val-de-Vire, Normandy. Songs on convivial themes, ascribed to him, but now attributed to Jean le Houx (*Livre des chansons nouveaux et Vaux-de-Vire*, 1610 and 1858), are usually regarded as the origin of modern vaudeville. The song "To My Nose," celebrating its ruddy efflorescence, is the best known. Consult: Gasté, *Etude sur Olivier Basselin et les compagnons du Vau de Vire* (Caen, 1866); and Gasté, *Olivier Basselin et le Vau de Vire* (Paris, 1887).

BASSERMANN, bä′sẽr-män, Heinrich (1849—). A German theologian. He was born at Frankfort-on-the-Main, and was educated at Jena, Zurich, and Heidelberg. In 1880 he was appointed professor of theology at the University of Heidelberg. His numerous writings include: *Handbuch der geistlichen Beredsamkeit* (1885); *Akademische Predigten* (1886); *Entwurf eines Systems evangelischer Liturgik* (1888); *Sine Ira et Studio. Der Entwurf der neuen preussischen Agende beurteilt* (1894).

BASSES-ALPES, bȧs′älp′. A southeastern department of France, bordering on Italy (Map: France, N 7). It has an area of 2685 square miles; is mountainous, watered by the Durance, has good pasturage, and is famed for its fruit. Population, in 1896, 116,028; in 1901, 112,763. Capital, Digne.

BASSES-PYRÉNÉES, bȧs′pē′rā′nā′. A southwestern department of France, bordering on Spain and the Bay of Biscay (Map: France, F 8). It has an area of 2943 square miles, nearly half of which is marshland. The chief rivers are the Nive and the Odour. It has active industries and a considerable trade through the city and port of Bayonne. Population, in 1896, 421,955; in 1901, 423,164. Capital, Pau.

BAS′SET, or **BAS′SET HOUND.** See Badger Dog and Hound.

BASSE-TERRE, bȧs′târ′ (Fr., lowland). The capital of the British West Indian island of Saint Christopher, or Saint Kitts, situated on the southwestern coast. It is well built and is of some commercial importance, having a trade in sugar, salt, etc. Population, about 10,000.

BASSE-TERRE. The capital of the French West Indian island of Guadaloupe, situated on the southwestern coast of the island, at the mouth of the Rivière-aux-Herbes (Map: West Indies, R 6). Its poor harbor has little commercial value. Basse-Terre is the seat of a bishop, and contains a number of fine public buildings. Population, about 8000.

BAS′SET HORN, or **CORNO DI BASSETTO,** kôr′nō dē bȧs-sĕt′tō (It. *bassetto*, somewhat low, dim. of *basso*, low + *horn*). A wooden wind-instrument similar to a clarinet in tone and fingering. It is now almost obsolete. Its compass is two and a half octaves, the notes written for it being from F to C^3. It sounds a fifth lower than the notes are written.

BAS′SETT, James (1834—). An American missionary, born near Hamilton, Ont. He graduated in 1859 at Lane Theological Seminary, served as chaplain from 1862 to 1863 in the Federal Army, and from 1863 to 1871 held various pastorates. In 1871 he became a missionary for the Presbyterian Board and traveled widely throughout Europe, spending many years in Turkey and Persia, in which latter country he was a pioneer missionary worker. He is believed to have been the first American to penetrate as far east as the tomb of Harun-al-Rashid at Meshed, Eastern Khorasan. He founded the mission in Eastern and Central Persia, and did much to effect the appointment of a United States legation to Persia. His publications include: *Hymns in Persian* (1873); *Among the Turcomans* (1880); a translation into Gaghatti Tartar of the *Gospel According to Matthew; A Grammatical Note on the Simnuni Dialects of the Persian* (1884); and *Persia, the Land of the Imâms* (1886).

BASSETT, John Spencer (1867—). An American historian; born at Tarboro, N. C. He graduated at Trinity College, N. C., in 1888, and afterwards was appointed professor of history there. His publications deal with researches in the history of North Carolina, and include: *The Constitutional Beginnings of North Carolina, 1663-1729* (Baltimore, 1894; *Johns Hopkins University Studies in History and Political Science*, Vol. XII., No. 3); *Slavery and Servitude in the Colony of North Carolina* (ib., 1896; do. Vol. XIV., Nos. 4, 5); and *Slavery in the State of North Carolina* (ib., 1899; do. Vol. XVII., Nos. 7, 8).

BAS'SET TA'BLE, THE (Fr. *bassette*, It. *bassetto*, a game of cards resembling faro, and invented in Venice). The title of a comedy by Susannah Centlivre (1706). As indicated by the name, the plot is built about the gaming-table.

BASS'FORD, WILLIAM KIPP (1839—). An American musician and composer, born in New York. He studied music there under Samuel Jackson, an organist, and after extensive tours throughout the United States as a concert pianist, became a teacher of pianoforte-playing, and organist of the Madison Square (New York) Presbyterian Church, and subsequently of Calvary Church, East Orange, N. J. His works include an opera, *Cassilda*, a *Mass in E-flat*, and much vocal and instrumental music.

BAS'SIA. See BUTTER-TREE.

BASSIM. See BASSEIN.

BASSO, bȧs'sō. See BASS.

BASSOMPIERRE, bȧ-sôɴ'pyâr', FRANÇOIS DE (1579-1646). A marshal of France. He was born at Harouel, in Lorraine, and at an early age gained the favor of Henry IV., whom he resembled greatly in character. He fought in Savoy (1602), in Hungary (1603), at La Rochelle (1628), at the Pass of Susa (1629), and in Languedoc (1631). He was also sent on diplomatic missions to Spain, to England, and to Switzerland. Made marshal in 1622, he awakened the suspicion and resentment of Richelieu, who, in 1631, caused him to be cast into the Bastille, from which he was not liberated until the death of Richelieu, in 1643. Bassompierre was a type of the silken swordsman of the courts of Henry IV. and Louis XIII., pictured so excellently by Dumas, and constantly engaged in fighting, plotting, and making love. At the time of his arrest he is said to have burned 6000 love-letters. His *Mémoires* (Cologne, 1665; Amsterdam, 1723), written in the Bastille, are extremely interesting.

BASSOON' (Fr. *basson*, It. *bassone*, from *basso*, low, called in Italian *fagotto*, bundle). A musical instrument of the double-reed variety, the bass of the wood-wind family of instruments. In 1539 Afranio, a canon of Ferrara, conceived the idea of bending double the long *bombardo* then in use, so as to make it easier for handling, hence the Italian name. It is made of maple-wood or plane-tree, with a long S-shaped metal mouthpiece, and is provided generally with 8 holes and 10 keys. Its enormous compass of 3 octaves, $B_1\flat$ to C^2, contains 3 registers: The lower — powerful, solemn, and majestic; the middle — sweetly expressive, but weak; and the upper register — sorrowful. In addition, it possesses certain tones that are comic to grotesqueness, as in the famous 'honor' monologue in Verdi's *Falstaff*. These combined qualities make the bassoon the most serviceable and frequently employed of the wind instruments (q.v.) in an orchestra. The notes for the bassoon are written on the bass-clef for the lower register, and on the tenor-clef for the higher. There are several sizes of bassoons, the most important among them the tenor bassoon, a fifth higher, and the double bassoon, an octave lower, than the ordinary bassoon. Bassoon is also the name of an organ-stop, the pipes of which are made to imitate the tones of the instrument.

BASSO-RILIEVO, bäs'sō rē-lyā'vō. See ALTO-RILIEVO.

BASSORA, bäs'sō-rȧ. See BASRA.

BASSORA GUM (from the city Bassora). A yellowish-opaque substance of vegetable origin, resembling gum arabic, but differing from it by being mostly insoluble in water.

BASS ROCK. A rocky islet in the Firth of Forth, 1½ miles off the coast of Haddingtonshire, Scotland (Map: Scotland, F 3). It rises precipitously 320 feet above the sea, and is about 1 mile in circumference. The only landing is found on the southwest side, and this is inaccessible in rough weather. The rock from west to east is tunneled by a cave accessible at low tide. Of volcanic origin, and geologically interesting, its chief importance arises from its historical associations. As a fortress and State prison, the principal event in its history was the siege sustained by 24 of James II.'s supporters against the forces of William III. during 1691-94, which ended in an honorable capitulation. This last Jacobean stronghold was dismantled, and the rock became private property. It is now tenanted by a keeper. It is the resort of innumerable flocks of sea-fowl, especially solan geese, which form a profitable source of revenue.

BASS STRAIT. The channel separating Tasmania from Australia (Map: Australia, G 6). It is about 185 miles long and from 80 to 150 miles broad, and contains many small islands. The name of the strait is derived from that of Dr. George Bass, who first proved that Tasmania was an island by circumnavigating it in 1798.

BASS (bās) **TU'BA.** See TUBA.

BASS'WOOD. See LIME-TREE.

BAST (origin obscure). A term originally applied only to the fibrous tissue occurring as the innermost layer of bark. These fibres are longer and more elastic than wood fibres, and often have considerable economic importance. The term has, however, come to have a more extended technical application. In the structure of the higher plants (ferns and flowering plants) a system of conducting vessels occurs ('vascular system'). These vessels are organized into strands called 'bundles,' each bundle consisting of two kinds of tissue, 'bast' and 'wood.' In this way, each bundle is double, one part consisting of bast elements ('phloem'), the other of wood elements ('xylem'). The vessels which enter into the structure of the bast (phloem) region are called 'sieve vessels' or 'sieve tubes,' being elongated cells in whose walls there are perforated plates. In ordinary shrubs and trees there is a zone of actively dividing cells between the bast and the wood called the cambium. This forms new bast on the outside and new wood on the inside, resulting in an annual increase in the diameter of the stem. In consequence of this, the bast or inner bark of the ordinary tree occurs in concentric zones. The bast varies accordingly in thickness, in fleshy roots and tubers representing most of the diameter. In trees in which the bark is not thrown off, the bast is very scanty, as in the beech, in which the entire bast zone in a tree 100 years old is only about 0.04 inch in thickness. If the bark is thrown off, the bast is more abundant, the concentric zones often being conspicuous, but not indicating the age of the tissue. It is known, for example, that in willows with a smooth bark a tree which is a dozen years old may not show more than three or four layers of bast; while in willows with a thick, rough bark, three or four concentric zones may be formed in a single year.

When the bast cells are first formed, they are like the cambium cells from which they are derived, and they do not change so rapidly as the wood cells. Hence there is not such a sharp line between cambium and bast as between cambium and wood. The bast region or phloem contains both sieve tubes and bast fibres, the sieve tubes being the more important in the economy of the plant, for they serve to carry proteids from parts in which these substances are stored or are being formed to parts where they are to be used. In the true flowering plants, each sieve tube is accompanied by what is called a 'companion cell,' the two cells having arisen from the division of a common parent cell. The ordinary conifers and ferns differ from the true flowering plants in having no companion cells. The duty of the companion cell seems to be to help in the distribution of the proteid substances contained in the sieve tubes.

The principal bast fibres in commercial use are those derived from the flax, hemp, jute, ramie, or china-grass, sunn hemp, and Cuba bast, or related species of Hibiscus. See FIBRE and the names just mentioned.

BAS'TABLE, C. F. (1855—). An Irish political economist, born at Charleville, Cork. He studied at Trinity College, Dublin, and in 1882 was appointed professor of political economy in Dublin University. In 1888-93 and 1897 he was an examiner for the University of London. Besides contributions to technical journals and articles for encyclopædias, he has published *An Examination of Some Objections to the Study of Political Economy* (1884): *The Theory of International Trade* (1897); *The Commerce of Nations* (1892); and *Public Finance* (1895).

BAS'TARD (OF. *bastard*, Fr. *bâtard*, probably from LLat. *bastum*, OF. *bast*, Fr. *bât*, pack-saddle; equivalent to OF. *fils-de-bast*, son of a pack-saddle, bastard, referring to the use of pack-saddles as beds in taverns, by muleteers). An illegitimate child, one neither begotten nor born in lawful wedlock; specifically, one born of a spinster, of a widow whose husband has been dead such a length of time as to make it impossible for him to be the father, or of a married woman when proof positive is produced that the paternity is other than of the husband. Where the mother is married, the presumption of the law is exceedingly strong in favor of the husband's being the father; the old English law went so far as to make the presumption conclusive in case the husband was, at the presumed time of conception, 'within the four seas surrounding Great Britain.' But proof to the contrary may now be adduced without such a limit. Under the Roman or civil law, a child born before the marriage of its parents was legitimated by their subsequent marriage. This principle is followed by the law of those countries which were grounded in the Roman rather than the English common law; namely, Scotland, and the nations of the Continent of Europe; and, in America, Louisiana, the Province of Quebec, and the States of Central and South America. In many States of the United States, the civil-law rule has been adopted by statute. The common law recognized no such principle, the nearest approach to it being the case of a *bastard eigné* (Old Law French), where a son born before marriage succeeded without opposition to the father's estate, although the latter had a legitimate heir; if the possession of the so-called *bastard eigné* was undisputed during his lifetime, and his legal heir claimed the estate, it was no bar to that claim to prove the bastardy of the father.

An illegitimate child is, in the old law phrase, *filius nullius*, the son of no one. His rights from his parents are those of support only. He has, at least under the common law, no legal name until by reputation he acquires one, and he has no right of inheritance as an heir. Furthermore, his own heirs at law can be only those of direct descent from him; if he die intestate, leaving no children or grandchildren, his property will not by law become that of father or mother, brother or sister, or uncle or aunt, but will escheat to the State; and in the United States may be claimed by the public administrator. But several of the States have by statute allowed an illegitimate child to inherit from his mother, and in some cases his mother to inherit from him as heir or next of kin. The maintenance of an illegitimate child devolves by common law in the first instance upon his mother; but in order that the child may not be a burden on the public, statutes in England and similar enactments in all of the States in this country allow proceedings to be taken to compel the father to aid in supporting the child. This procedure is based, not on the theory that the child has a right to his support, but solely to prevent the burden of support from falling upon the parish or county. The usual practice in such a proceeding is for the alleged paternity to be established by direct evidence (the affidavit of the mother being admitted as of strong, though not necessarily conclusive, weight) after which the putative father is called on to give bond to the magistrate or overseers of the poor to contribute a fixed sum for an agreed time to the support of the child. (See AFFILIATION.) The custody of the child belongs primarily to the mother, but the court may determine the time during which such custody may last. In all civil and criminal rights not connected with the law of inheritance, or of support from parents, the status of the bastard is the same as that of any other person. He may hold and dispose of real and personal property, may sue and be sued, may devise by will, and may claim the protection of the State in all respects as though he were legitimate. In questions of settlement arising under poor-laws, it has been held that his legal domicile is that of the mother, not, as with legitimate children, of the father, until he attains a settlement of his own. It has also been held that the ordinary right of a father to appoint by will or deed a guardian for his minor child does not exist in the case of a bastard.

The term has not always been one of contempt and humiliation. William the Conqueror was not ashamed to sign himself 'Guillaume Bastard': and the title has been borne without reproach by many other characters famous in history, as Don John of Austria, and Dunois, 'the Bastard of Orleans.' Consult: The *Commentaries* of Kent and Blackstone; also, Schouler, *Treatise on the Law of the Domestic Relations* (5th ed., Boston, 1895).

The sociological significance of bastardy first received serious attention in connection with the development of the English Poor-Law. It was recognized that not merely the rights of the individual with respect to the inheritance of property and the right to parental support, but also the rights of the public to be protected from the public burden of supporting illegitimates, are involved in the principles determining legislation relating to bastards. In 1575-76 an act (18 Eliz., cap. 3) was passed which was and is still the basis of bastardy law; it charged the justices to punish the mother and reputed father of every bastard child in the several parishes of England by compelling the payment of money weekly, or, in default, by imprisonment, in order that the parishes, which had previously been liable for the support of bastard children, might be relieved and rendered better able to support 'the impotent aged true poor.' Consult Nicholls, *History of the English Poor-Law*, Vol. I. (London, 1854). See ILLEGITIMACY; POOR-LAWS.

BASTARD BAR, or **BAR SIN′ISTER.** See BATON.

BASTARD OF OR′LEANS. A name given to Jean Dunois (1402-68), the natural son of Louis, brother of Charles VI. of France. The title of Count of Orleans was conferred upon him for his achievements in the Hundred Years' War.

BASTARD SAFF′RON. See SAFFLOWER.

BASTAR′NÆ. The earliest Teutonic people of historic mention. They migrated through the Vistula Valley to the Lower Danube about B.C. 200. They are mentioned in the monument commemorating the victory of Crassus in B.C. 28, where they appear with pointed beards and wearing trousers. Consult Keane, *Man: Past and Present* (Cambridge, 1899).

BASTIA, bȧs-tē′ȧ (It., fortress, bastion). The chief commercial town of the insular Department of Corsica (Corse), France, on the east coast, opposite the Isle of Elba, 98 miles northeast of Ajaccio, by rail (Map: France, Q 8). Its streets are narrow and crooked, but its buildings are comparatively modern; it has two harbors, the new and the old, and a fine marine parade, adorned with a marble statue of Napoleon by Bartolini. The citadel and the Cathedral of San Giovanni Batista are noteworthy. Its public institutions are a lyceum, a library with over 30,000 volumes, and fine collections of natural history. Wax candles, liqueurs, macaroni, and soap are manufactured, and the marble quarries, tanyards, and dyeworks give employment to many operatives. The town is the seat of a United States consular agent. Bastia was built by the Genoese in 1380, and derives its name from the strong fortress or bastion which they built to protect it. After its cession to France in 1768 it became the capital, but in 1811 Ajaccio was selected in its place. Population, in 1896, 20,300.

BASTIAN, bäs′tē-an, ADOLF (1826—). A German traveler and anthropologist. He was born at Bremen, June 26, 1826, and was educated as a physician, studying at Berlin, Heidelberg, Prague, Jena, and Würzburg. His authority as an anthropologist rests upon an immense storehouse of facts, gathered during a series of extensive journeys in Asia, Africa, Australia, and America. The first of these was begun in 1851, when he went to Australia as the surgeon of a sailing vessel. He returned to Germany in 1859, after having passed from Australia to South America and the West Indies, and thence back again across the Pacific through China, India, Palestine, Egypt, Cape Colony, the West Coast of Africa, and Congo. From 1861 to 1865 he was again absent on a prolonged journey through Farther India, Japan, and China. In subsequent voyages he revisited Africa and South America, and made extensive explorations in such widely scattered lands as Persia, New Zealand, Yucatan, and the Caucasus. In 1896 the indefatigable traveler, at the age of 70, started out once more upon a voyage through the Malay Archipelago. In 1866 Bastian became docent at the University of Berlin, and subsequently was made professor of ethnology. In 1869, with Virchow and R. Hartmann, he became editor of the *Zeitschrift für Ethnologie*, the organ of the Berlin Anthropological and Ethnological Society, of which he was one of the founders. He became in 1886 director of the new Museum für Völkerkunde. In 1901 he was editor of the *Ethnographisches Notizblatt*, published in Berlin. Bastian is a prolific writer, and since 1859 has published nearly 60 works, comprising more than 80 volumes, dealing with various subjects in anthropology. Within that province his range is extremely wide, his works embracing both ethnographic studies in the narrow sense, as well as philosophic investigations in race and human psychology. A partial list of his works may serve to indicate the broad sweep of his acquirements in anthropology: *Der Mensch in der Geschichte* (3 vols., 1860); *Das Beständige in den Menschenrassen* (1868); *Beiträge zur vergleichenden Psychologie* (1868); *Ethnographische Forschungen* (2 vols., 1871-73); *Schöpfung oder Entstehung* (1875); *Die Vorgeschichte der Ethnologie* (1881); *Der Buddhismus in seiner Psychologie* (1882); *Amerikas Nordwestküste* (1883); *Inselgruppen in Oceanien* (1883); *Indonesien* (1884-94); *Der Fetisch an der Küste Guineas* (1884); *Die Seele indischer und hellenistischer Philosophie* (1886); *Ueber Klima und Acclimatisation* (1889); *Ideale Welten* (1893); *Vorgeschichtliche Schöpfungslieder* (1893); *Ethnische Elementargedanken* (1895); *Die mikronesischen Kolonien* (1899-1900); *Die Völkerkunde und der Völkerverkehr* (1900).

BASTIAN, bäs′tyan, HENRY CHARLTON (1837—). An eminent English physiologist. He was admitted to the Royal College of Surgeons in 1860, was assistant curator in the Museum of the University College, in London, from 1860 to 1863; professor of pathological anatomy in the same college from 1867 to 1887; professor of principles and practice of medicine from 1887 to 1897; and physician to the University College Hospital from 1867 to 1897. In 1898 he was elected emeritus professor of the principles and practice of medicine at University College, London. He published *The Modes of Origin of Lowest Organisms* (1871); *The Beginnings of Life* (1872); *The Brain as an Organ of the Mind* (1880); *Paralysis* (1886); *Hysterical or Functional Paralysis* (1893); *A Treatise on Aphasia and Other Speech Defects* (1898); and many contributions to medical and philosophical journals. He is recognized as an authority in the pathology of the nervous system, and was one of the ablest defenders of the theory of spontaneous generation.

BASTIAT, bå'styå', FRÉDÉRIC (1801-50). An eminent French political economist. He was born at Bayonne, June 29, 1801. His father was a merchant, and educated his son with a view to the same pursuit. After completing his studies, Bastiat entered the commercial house of one of his uncles, employing his leisure hours in the study of political economy. In 1831 he became justice of the peace at Mugron, and in the following year member of the Council-General of the Department of Landes. Circumstances called him into Spain and Portugal in 1840, where he took advantage of the opportunity afforded him to study the customs and institutions of these two countries. His first appearance as an author was in 1844, when he published, in the *Journal des Economistes*, an article entitled "De l'influence des tarifs français et anglais sur l'avenir des deux peuples." It contained in germ the theory of political economy subsequently developed by Bastiat, who, from that moment, was known as a decided opponent of the system of Protection. Subsequently, in the same journal, he combated the economic fallacies of Socialism and the rights of labor. During a visit to England, he made the acquaintance of Cobden, and on his return to France he translated (1845) the speeches of the Free-Trade advocates, which he published in Paris with an introduction, entitled *Cobden et la ligue; ou l'agitation anglaise pour la liberté des échanges*, in which he presented a complete summary of the arguments against the protective system. Bastiat continued to propagate his views with considerable success. He became secretary of the societies and chief editor of the journal established to vindicate the principles of Free Trade. After the Revolution of 1848, he was elected successively a member of the Constituent and Legislative assemblies. In 1850 he came forward as the antagonist of the Socialist writer, Proudhon. Suffering from pulmonary disease, he repaired to Italy for change of climate, but died at Rome on December 24, 1850. Besides the writings mentioned, Bastiat published *Sophismes économiques*; *Propriété et loi*; *Justice et fraternité*; *Protectionisme et communisme*; *Harmonies économiques*; and several other important treatises, all of which exhibit extensive knowledge of the subjects discussed, convincing logic, and a power of sprightly and biting satire. The *Harmonies économiques* and the *Sophismes* have been translated by J. P. Stirling. While his writings have had great influence, they did not establish a system of political economy which has found general acceptance. A new edition of his works in seven volumes was published at Paris in 1881. Consult Bondurand, *Frédéric Bastiat* (Paris, 1879).

BASTIDE, bå'stēd', JULES (1800-79). A French publicist and politician, born in Paris. In 1821 he became one of the first members of the French Carbonari, and after the July Revolution he was conspicuous among the writers of the radical opposition. On the reconstruction of the National Guard he was elected commandant-in-chief of the legion of artillery, and took part in the two insurrectionary movements, for the second of which—the *émeute* in Paris, June 5, 1832—he was condemned to death, but escaped to London. Pardoned in 1834, he returned to Paris, and again devoted himself to politics, contributing articles to a daily journal, the *National*, of which he became editor in 1836. In 1847 he founded the *Revue Nationale*. He was one of the principal agitators in the Revolution of 1848, and became Minister of Foreign Affairs. After the *coup d'état* he withdraw from political life. He published *La république française et l'Italie en 1848* (1858); *Guerres de religion en France* (1859), and other works.

BASTIEN-LEPAGE, bås'tyăN' le-päzh'. JULES (1848-84). A French painter. He was born at Damvillers, November 1, 1848, and died in Paris, December 10, 1884. His bent toward art began in his early years, and at the age of five he would copy things by the wayside. This tendency was further developed by his father, who encouraged him, during winter evenings, to copy some household object. After taking several prizes for drawing at the College of Verdun, he went to study in Paris in 1867. Here, for the first six months, he was a student by day, and at night a postal agent. Finding this life impracticable, he gave himself entirely to art study, entering the class of Cabanel at the Ecole des Beaux-Arts. His family managed to contribute a small monthly sum with which to increase a pension of 600 francs allowed him by the Council-General of the Meuse. The first of his pictures to command attention were in the Salon of 1874, where he exhibited "The Song of Spring" and a "Portrait of My Grandfather." The picture of his grandfather struck a new note in portrait art, and the artist was immediately called a revolutionary. It was a portrait painted *en plein air*, and full of delicate outdoor light, very truly recorded. The attitude of the figure was unconventional; the model was in the act of snuff-taking, snuff-box in hand and handkerchief over knee. From this time on, Lepage scored a success at the Salon, although he failed in his two efforts to secure the Prix de Rome. This was, in a way, fortunate for his future, for he was little in sympathy with school traditions. His chief canvases are "The Haymakers" (1878), in the Luxembourg (Paris); "The Potato Gatherers" (1879); "Joan of Arc Listening to the Voices" (1880), Metropolitan Museum of Art, New York. Mention should also be made of "The Beggar" (1881), "Love in a Village" (1883), and his last dated work, "The Forge" (1884). His numerous portraits are remarkable for strong characterization, attained through the closeness of their drawing. Among his notable subjects are Mme. Sarah Bernhardt, Albert Wolff, the Prince of Wales (Edward VII.), and Gambetta on his deathbed. He received several medals and was made a chevalier of the Legion of Honor (1879). Consult: Marie Bashkirtseff, *Journal intime* (Paris, 1890); A. Theuriet, *J. Bastien-Lepage, l'homme et l'artiste* (Paris, 1885).

BASTILLE, bås-tēl' (Fr., fortress, from OF. *bastir*, to build). A name originally applied in France to any building constructed of masonry, with towers or bastions adapted for defense. These fortresses were once very numerous, especially at Paris; but Cardinal Mazarin, as a part of his anti-feudal policy, allowed only a few of them to remain standing, among these being the Castle of Paris, to which the name Bastille was at last exclusively applied. This castle developed from two towers on either side of the road which entered Paris by the Faubourg Saint-Antoine. By the orders of Charles V., Hugues Aubriot converted the towers into a castle of four bastions, connected by thick walls; the whole being surrounded by a moat 25 feet deep. The number of bastions was subsequently doubled, and the area of the whole correspondingly increased. The Bastille, from its commanding position, was closely connected with important affairs in French history, and was occupied by the Guises in 1588; by Henry IV. in 1594; the Frondeurs in 1649; and Condé in 1652. During its entire history it was utilized as a State prison, there being cells and dungeons for as many as 80 prisoners — a limit often reached. There was undoubtedly considerable severity exercised at different times, but whether the treatment there was any more strict than the customary prison discipline of the age, it is hard to determine. It seems established that many of the noble prisoners, at least, were treated with considerable lenity; but accounts of cruelty, some of which were probably well founded and others exaggerated, and the association of the Bastille with the use of the *lettres-de-cachet* (q.v.), which kept so many in confinement without trial, caused this prison to be regarded as the symbol of oppression. It was natural, therefore, that the Bastille should be one of the first objects of attack at the outbreak of the Revolution. On July 14, 1789, the populace of Paris, recruited chiefly from the Faubourg Saint-Antoine, attacked the fortress and stormed it after a half-hearted resistance by the Governor, De Launay, and a handful of Swiss. The Governor and seven of his men were killed, the archives of the prison scattered, and the prisoners, seven in number, were carried through the streets and hailed as victims of tyranny, and martyrs in the people's cause. The building itself was torn down. The anniversary of the taking of the Bastille is celebrated every year as the national holiday of France. A bronze column now marks the site of the Bastille.

Consult: Arnold, *Histoire de la Bastille* (Paris, 1845-59); Bingham, *The Bastille* (London, 1888); Davenport, *History of the Bastille* (London, 1837); Funck-Brentano, *The Bastille*, Eng. trans. (New York, 1900). The documentary records which escaped destruction are contained and explained in Ravaisson, *Les archives de la Bastille* (6 vols., Paris, 1866-73).

BAS'TINA'DO (Sp. *bastonada*, Fr. *bastonnade*, from OF. *baston*, Fr. *bâton*, cudgel). The name given by Europeans to the punishment in use in the Orient, which consists in blows with a stick, generally upon the soles of the feet, but sometimes upon the back.

BAS'TION. A tower or projecting portion of the walls of a fortification, and the most important part of the fortifications of the *enciente.* (q.v.) The rampart forming a bastion is constructed as if on four sides of a pentagon, two of which (called the *faces*) form an angle, with the point toward the exterior; the other two sides (the *flanks*) connect the extremities of the faces with the adjacent curtains. The fifth (supposed) side of the bastion is left open, the intervening space being known as the *gorge.* The bastion system dates back to the first rude means used in fortification, which probably consisted of nothing more than simple inclosures, surrounded with palisades; a devise still employed by the natives of semi-civilized States. High walls with breastwork or parapets undoubtedly followed, to enable the defenders to examine the surrounding country. The bastion as it is known to-day, however, is of Italian origin, the most ancient at present existing bearing the date of 1527, and being situated at Verona. Vauban (q.v.) developed the bastion in his scheme of fortification, and built many famous examples. So far as the use of bastions in the defense of modern forts is concerned, modern armaments may be said to have made them unnecessary; but as it will in all probability be a long time before they disappear entirely, the history of fortification is unintelligible without some knowledge of them. Every fort or redoubt, if not circular, must have several sides, which are known as fronts. To enable the defense to concentrate the fire of a whole front on any point opposite it, or to command its own ditches, the line of front is broken up into a number of lines in a peculiar manner, and the result is then said to be a bastioned front. There is no complete bastion in any bastioned front; only two half bastions. If another bastioned front, adjoining this one, were constructed, a complete bastion would appear; and if all the exterior sides inclosing the position were so treated, a complete bastion would appear at each corner. Bastions are generally designated by numbers, as are also the guns and the fronts. The numbers are according to the fronts, and begin with the first one to the right of the exit of the main gate, and continue with the sun. The advantage thus afforded, is that it enables any particular gun to be specified, even if its number be unknown. Thus, the first gun on the right face of the second bastion, etc. See FORTIFICATION.

The relation which bastions bear to the general system of attack and defense is noticed under FORTIFICATION, where is given the historical development of methods of defense, illustrations, and a list of works treating this subject.

BASU'TOLAND. A British Crown colony of South Africa, situated between Orange River Colony, Natal, and Cape Colony, covering an area of nearly 10,300 square miles. (Map: Cape Colony, M 6). It has an elevated surface and a very rich soil, being considered one of the best grain-producing countries in South Africa. In regard to climate, Basutoland is considered the most healthful place in that section of the Continent. The principal products are cereals and live animals. Minerals are supposed to exist, judging from some indications, but so far none has been worked, with the exception of coal. The commerce of the colony, while not very extensive, shows a constant increase. The imports consist chiefly of clothing and blankets, agricultural implements, metal products, and groceries. The imports and exports for the fiscal year 1900 amounted to £85,528 and £133,864 respectively. Basutoland is administered by a resident governor, under the High Commissioner for South Africa. It is divided into seven districts, subdivided into wards administered by native chiefs. The administration of justice is also, to a very large extent, left in the hands of native judges. The revenue of the colony is derived chiefly from a native hut-tax, license fees, post-office receipts, and an annual contribution from Cape Colony. The revenue and expenditure for 1900 amounted to £69,769 and £59,492 respectively. Education is well advanced, and is carried on almost exclusively by missionaries.

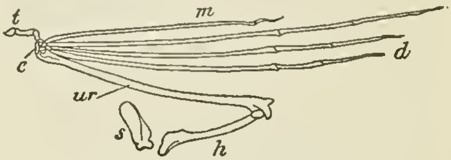
The population of the colony is estimated at about 260,000, and consists almost entirely of Basutos, a Bantu people, composed of several coalescent tribes, short in stature, regular in features, and with thinner lips than the Kaffirs, whom they resemble. They have advanced remarkably through the efforts of French missionaries, and are becoming a civilized Christian nation, taking up readily modern ideas. Their language was reduced to writing by missionaries, and forms a considerable literature. The capital of the colony is Maseru, with a population of about 900. Basutoland was established a separate State at the beginning of the Nineteenth Century. The first collision between the Basutos and Great Britain occurred in 1852 and resulted in the defeat of the former. In 1856 a boundary dispute arose between the Basutos and Orange Free State, which was continued for about two years without any results. In 1866 a part of Basutoland was ceded to the Orange Free State, whose authority was recognized by the Basutos. But this settlement did not mark the termination of hostilities, which still continued for several years. As the result of an appeal from the Basutos to Great Britain, Basutoland was annexed to Cape Colony in 1871. For the next twelve years the colony was in an almost uninterrupted state of rebellion and chaos, which culminated in its separating from Cape Colony in 1884; since then it has been administered as a separate colony. Consult: Mrs. Barkley, *Among Boers and Basutos* (London, 1900); Lagden, "Basutoland and the Basutos," in *Colonial Institute Journal*, Vol. XXXII. (London, 1901); Bryce, *Impressions of South Africa* (London, 1899); Widdicombe, *Fourteen Years in Basutoland* (London, 1892).

BAT (Fr. *bât*, OF. *bast*, pack-saddle). A British army term, originally the name of a kind of pack-saddle, used on foreign service, for the transport of baggage, etc. A *bat-horse* is an animal carrying such a pack, and the soldier or man in charge would be termed a *bat-man*. By a modification of meaning bat-man was used to denote a soldier allowed to act as servant to an officer. At the present time, the term 'bat-man' is applied only to the soldier responsible for the care and cleanliness of the clothing, arms, and equipment of a warrant, staff, or regimental noncommissioned officer. The money received for such service, wheh is paid by the interested noncommissioned officer, is termed bat-money. The former commissioned officers' bat-man is now known as soldier-servant.

BAT (OE. *back*, *balke;* cf. Swed. *natt-bakka*, night-jar, Dan. *aftenbakke*, evening-bat, Icel. *lepr-blaka*, leather-flapper, from *blaka*, flap, flutter). A small, furry mammal of the order Cheiroptera, having membranous wings, and almost exclusively aërial in its habits. The power of flight, which exceeds that of birds or insects, is the distinguishing feature of these animals, which otherwise resemble the Insectivora in most respects; and their whole organization has been modified toward its perfection and the pursuit of an aërial life. Most of them are of small size, though a few reach the bigness of a large rat, and have a spread of wings measuring five feet.

Structure. The vertebral column is short and compact, the thorax capacious, to make room for the proportionately very large heart and lungs, and the breast-bone (which is keeled like that of birds) and shoulder-girdle are very large and strong to afford attachment to the great muscles operating the wings; while the pelvic girdle is small and weak. Reversing the rule among mammals, the fore-limbs are developed vastly in excess of the hind ones, which, although provided with perfectly formed feet, are practically useless for locomotion on the ground, though of service in climbing, and particularly in clinging to some support, from which the creature hangs head down when at rest—its customary attitude of repose. The bones of the limbs are permeated by medullary canals so large as to make them practically hollow; other bones are light and slender, and the ribs much flattened.

Wings.—The modifications of the limbs with reference to flight are very great (see illustration). The shoulder-bones (clavicle and scapula) are much enlarged and strengthened. The humerus (*h*), though long, is scarcely two-thirds as long as the forearm, where the radius (*ur*) is so lengthened that in some species it is as long as the head and body together (the ulna is rudimentary and firmly soldered to the radius); the wrist or carpal bones (*c*) are compact, and more or less soldered together at the radial joint; the metacarpals (*m*, equivalents of the bones of the 'back' of the human hand) are prolonged to lengths varying in the different families, but always equaling or exceeding the length of the body, and terminate in fingers (*d*) consisting of a varying number of phalanges. An exception to this, however, is made by the thumb (*t*), which is very short, free from the wing-membrane, and terminated by a strong claw greatly used by the animal in climbing or holding on to a support. Thus the length of the arm and hand may be 15 or 20 times as great as the breadth of the shoulder.



SKELETON OF BAT'S WING.

s, scapula; *h*, humerus; *ur*, ulna-radius; *c*, carpus (wrist-bones); *t*, thumb; *m*, metacarpal bones; *d*, digits (fingers).

The position of the bones is changed, so that while ability for a rotatory motion is lost, greater power for an up-and-down (antero-posterior) motion is gained. The hind-limbs are also lengthened in the leg-bones; but here the notable change is in the lateral position and spread gained through a twisting outward so extensive that the knee is directed backward instead of forward. Upon this light, strong framework, moved and controlled by powerful pectoral muscles, is stretched a flexible, leathery, nearly hairless membrane (patagium), which is double, and is really an extension of the skin. It envelops all the bones of the arm and hand, and thence stretches to the hind-leg (leaving the foot free), and in most families to, or nearly to, the end of the tail; but its relative size and shape vary. Stretching this great membrane and beating the air with it, the bat flies with more than the agility of a bird, though more slowly, and when it rests it folds the membrane somewhat like a fan against its sides, or wraps it about its body like a protecting mantle.

Sense-Organs.—The brain and nervous system of bats are comparatively low in organization, but their sensory faculties are remarkably developed in adaptation to their crepuscular and nocturnal habits. 'As blind as a bat,' is a mistaken simile. All have efficient eyes, those of the Oriental fruit-eating sorts being of a size natural to their fox-like countenances. In our more familiar insect-eating species they are likely to be small, bead-like, and nearly hidden in the very soft fur with which these animals are clothed; the old English and German names 'flitting mice,' were not bad ones. The senses of smell and taste are probably well developed. The sense of hearing is no doubt exceedingly acute and largely depended upon. All bats have prominent and very mobile ears, and in many of the insect-eaters, the external ear expands in an enormous membrane, sometimes many times larger than the whole face, supplemented by appendages, ribbed, crinkled, and otherwise modified, and in some forms able to be folded down out of the way of harm. These expansive ears are evidently of more utility than simply to catch waves of sound, and are related to the extraordinary sense of touch, which perhaps is carried to a higher degree of delicacy in these than in any other animals. In addition to them a large section of the order possesses 'nose-leaves'—more or less wrinkled and complicated upright growths of thin skin from the end of the nose, which often give to the face a most grotesque appearance. Two of the most extraordinary examples are shown on the accompanying plate — the flower-nosed bat (Fig. 7), a native of the Solomon Islands; and Blainville's chin-leafed bat (Fig. 5) of South America. On the other hand, in some species such appendages are wholly absent, as in the ugly naked bat (Fig. 3) of the Malay countries.

All these membranes, as well as those of the wings, are filled with blood-vessels and numerous ramifications of fine nerves, which take the form elsewhere seen in especially sensitive surfaces, and they are regarded as apprising the creature, in a way not fully understood, of the nearness of obstacles, and giving other useful information. This was illustrated by the celebrated experiments of Spallanzani, about 1775. He blinded bats with varnish, and let them fly in a chamber filled with stretched and dangling strings. These and other obstacles they avoided; they turned corners, found holes for escape or concealment, and behaved as though eyesight were unnecessary; stoppage of the ears, however, caused them some embarrassment. Other observations have confirmed their ability, apparently through extreme sensitiveness of the exposed membranes, to sense objects without sight or actual touch.

Distribution. Bats are distributed in all parts of the world, and, as might be expected from their powers of flight, inhabit many remote islands, such as Bermuda and New Zealand—the only indigenous mammals of the latter being two species of bats. They are absent, however, from the coldest parts of the world, and are most numerous in the Eastern tropics, to which some groups are confined: in fact, the race is characteristically tropical. In rather cold climates, such as that of Canada, some species have acquired a habit of migration, going south to some extent in the autumn, as the northern winters are too long to be survived in a state of uninterrupted hibernation. This seems to be the case, according to Merriam, with two species of North American bats, both of which habitually rest in trees instead of in the warmer recesses of caves. The number of kinds of bats is so great that about 450 species are now recognized; and the enormous companies of certain species that congregate in favorable places are unrivaled elsewhere among gregarious mammals, and recall the great flocks of sea-birds to be seen in certain nesting localities.

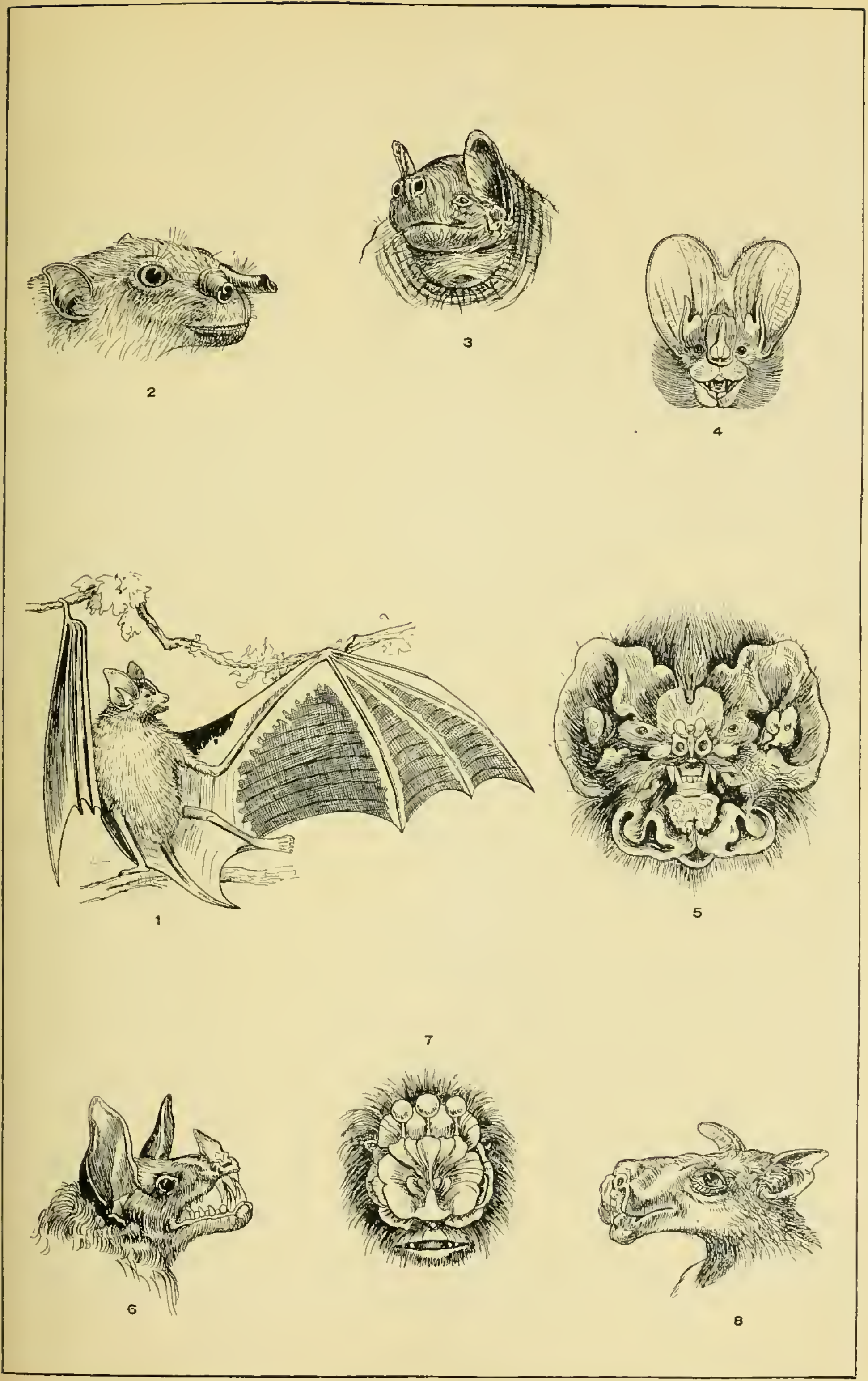
Ancestry. Few fossil remains of bats are known. In the Upper Eocene deposits of Aix, France, has been found a well-developed bat's wing, and in other portions of the Tertiary deposits of the same country have been found skulls of species that very closely resemble those of modern forms. In North America their remains are known in fragmentary condition from the Eocene, Miocene, and Post-Tertiary deposits, and in South America they have been recognized in the cave deposits of Brazil. All these differ little from living genera.

Classification and Habits. Bats are classified as an order, divisible into two sections, Megacheiroptera and Microcheiroptera.

Megacheiroptera.—These are lowest in rank, and include the large-sized fruit-eating species, mainly of the Oriental tropics. The lowest in rank are the fox-bats or 'flying-foxes' of the family Pteropodidæ. They are described under the titles Fox-Bat and Fruit-Bat.

Microcheiroptera.—In this division are found all other bats—the ordinary bats of temperate climates, as well as many tropical ones—which agree in being of small size, in living, as a rule, upon insects to which their dentition is suited, and in having more or less of a tail enveloped in an interfemoral membrane. The first family is that of the Horseshoe Bats (Rhinolophidæ), whose snouts bear such appendages as have been described, differing according to species. They are scattered throughout Southern Asia, where many species are well known, and a few extend into Europe and the British Isles. Most of them are of the ordinary brown color, but an Australian species is bright orange in the male and yellow in the female. A family having still more prominent growths about the nose and ears is that of the Leaf-nosed Bats proper (Nycteridæ). Two genera inhabit Eastern Asia, represented by the lyre-bat (*Megaderma lyra*), whose vast ears are joined together above the head, and which sometimes attacks and kills other bats and small mammals, sucking their blood. In the next family, *Vespertilionidæ*, are grouped the 'true,' or familiar, small, naked-faced bats of all countries. They feed almost exclusively on insects, which they capture in flight, and which their sharp and numerous teeth are fitted to hold and crush: they spend the hours of daylight in caves, ruins, hollow trees, garrets, and similar hiding-places, sometimes resorting to caverns in vast numbers, and so continuously that thick

BATS



1. A TYPICAL BAT, showing parachute.
2. TUBE-NOSED FRUIT BAT (Harpyia).
3. MALAYAN MASKED BAT (Cheiromeles torquatus).
4. INDIAN FALSE VAMPIRE (Megaderma lyra).
5. CHIN-LEAFED BAT (Mermops megalophylla).
6. AMERICAN FALSE VAMPIRE (Vampyrus spectrum).
7. FLOWER-NOSED BAT (Anthops ornatus).
8. HAMMERHEAD (Hypsignathus monstrosus).

deposits of valuable guano are formed, as is the case in certain parts of Texas. At dusk they sally forth, alone, or in pairs, and hunt the air for their minute prey. In cold climates they spend the winter hanging in some retreat (each species exercising a preference in this matter) in a semi-torpid state, and occasionally appear during warm spells. One, or sometimes two, young are born in the spring, and carried about clinging to the mother's breast, where two nipples yield milk. The commonest European bats, in regard to which much folk-lore and no little of foolish superstition are related and still believed among the ignorant, are the long-eared (*Plecotus auritus*), the barbastelle (*Barbastellus communis*), the pipistrel or flittermouse (*Vesperugo pipistrellus*), abundant all over Europe and Central Asia, and the serotine (*Vesperugo serotinus*), which is almost world-wide in its distribution. Here belong also all the common North American bats, of which the most frequently seen in the northern United States are the little brown bat (*Vespertilio* [*or Myotis*] *subulatus*) and the red bat (*Lasiurus borealis*). All these have a long tail, extending a spacious triangular membrane, which is further sustained by two bones springing from the 'heels' of the hind-feet, and which serves a most useful purpose in those dodgings through the air so characteristic of the bat's flight.

The remainder of the bats form the Emballonurine section of the group. The typical family, Emballonuridæ, consists of small tropical and subtropical species of both hemispheres, which have a naked muzzle, in which the nostrils project beyond the lower lip, and a tail sometimes longer than the interfemoral membrane. Many are South American. One section embraces the molossine, or mastiff-bats, of which a sooty brown species dwells in southern California. They are noted for the thickness and freedom of the hind-limbs and tail. Another family, the Phyllostomatidæ, is confined to Central and South America, where it represents the nose-leafed bats of the Old World, having many appendages about the nostrils. Many of them eat fruit or suck the blood of animals as well as feed upon insects, and one, called *Vampyrus spectrum*, is the largest and most repulsive of American bats; it is a fruit-eater. (See Colored plate of Mammalia, and plate of Bats.) Here, however, are classed the true vampires of the genus Desmodus. See Vampire.

Bibliography. For the bats of the Old World, consult the standard works, and Dobson, *Catalogue of the Bats in the British Museum* (London, 1878); for North American species, Merriam, *Transactions, Linnean Society of New York*, Vol. I. (New York, 1882); Allen, *Bats of North America*, Bulletin No. 43, U. S. National Museum (Washington, 1893); and the writings of Waterton, Gosse, Bates, Belt, Wallace, Poey, and Hudson for bats of tropical America. For the East Indian fruit-bats, consult: Wallace, *Malay Archipelago* (New York), and Blanford, *Fauna of British India: Mammals* (London, 1888-91).

See Fruit-Bat; Hammerhead Bat; Harpy Bat; Lyre-Bat.

BATAC, bȧ-täk′. A town of Luzon, Philippines, in the Province of Ilocos Norte, 10 miles south of Laoag. It was founded in 1587. Population, in 1898, 17,625.

BATAK, bȧ-täk′. A Tinitiano tribe living on Palawan Island. See Philippines.

BATALEUR, bȧ′tȧ′lẽr′. See Eagle.

BATAN, bä′tȧn. A town of Panay, Philippines, in the Province of Capiz, situated 31 miles from Capiz. Population, in 1898, 12,908.

BATABANÓ, bȧtä′bȧ-nō′. A town of Cuba, situated in the Province of Havana, near the southern coast of the island, 37 miles by rail from Havana. Diego Velasquez in 1514 founded San Christóbal de la Habana on the present site of Batabanó. Population, in 1899, 1025.

BATANES, bȧ-tä′nȧ. A Malay people living on Batanes Island. They have a separate dialect. See Philippines.

BATANGAS, bȧ-tän′gȧs. A seaport town, the capital of the province of the same name, on the Island of Luzon, Philippines (Map: Luzon, F 12). The province covers an area of 1153 square miles on the peninsula opposite the Island of Mindoro, and has a population of about 212,000. It contains a number of high mountains and Lake Bingabon, or Taal, with the volcanic mountain of Taal in its centre. The province produces extensively sugar and cocoanut oil, and has manufactures of dyestuffs, and silk, abaca, and cotton fabrics. The capital of the province, 72 miles south of Manila, lies at the mouth of the Calumpang River, on the Bay of Batangas. It has a fine harbor. The city is well built, and among its prominent buildings are a royal palace and a convent. A number of annual expositions, which attract a considerable attendance, are held in the city. Population, 39,358.

BATAN (bä′tȧn) **IS′LANDS** (Sp. *Islas Batanes*). A group of islands in the northern part of the Philippine Archipelago, situated north of the Babuyan group, between latitudes 20° and 21° N. (Map: Asia, M 6). The principal islands are Ibayat, 22 square miles; Sabtan (Saptang), and Batan, 21 square miles. The total area of the group is less than 60 square miles. The population is estimated at 10,000. Administratively the group forms a separate province, with Santo Domingo de Basco (3000) on Batan as capital.

BATARDEAU, bȧ′tär′dō′ (Fr., a dam, dimin. of OF. *bastard*, dike). A term in military fortification designating the wall, generally of masonry, and sometimes furnished with a sluice-gate, built across the outer ditch of a fortress, to sustain the pressure of water in those parts of the ditch requiring inundation. See Fortification.

BATATAS, bȧ-tā′tȧs. See Sweet Potato.

BATA′VI. The name of a German people, who anciently inhabited a part of the present Holland, particularly the island which was called after them, Insula Batavorum, formed by the branch of the Rhine which falls into the sea at Leyden, the Waal, and the Maas. Their country, however, extended across the Waal, but its boundaries cannot now be precisely determined. According to Tacitus, they were originally a branch of the Chatti, who emigrated across the Rhine. They were conquered by Germanicus, became subject to the Romans, and served them so well that they obtained the honorary title of 'friends and brothers of the Roman people'; were exempted from taxes and assessments, being required to provide only a proportion of troops, and were permitted to choose their commanders from among themselves. Their cavalry was particularly good, and was often employed by the Romans. The first who terms the insular district inhabited by the Batavi, Batavia, is Zosimus, who also informs us that in the time of Constantius (A.D. 358) it had fallen into the hands of the Salii, a Frankish tribe.

BATA′VIA, *Dutch pron.*, bä-tä′vē-ä. Properly the name of the island occupied by the ancient Batavi. At a later date it became the Latin name for Holland. The name BATAVIAN REPUBLIC was given to the Netherlands on their new organization by the French in May, 1795, and they continued to bear it till they were converted into the Kingdom of Holland, under Louis Bonaparte, in June, 1806.

BATA′VIA (*Batavia*, 'good land,' the ancient name of modern Holland, the motherland of the city in Java). The capital and chief city of the Dutch East Indies. It is situated on the northern coast of Java, in latitude 6° 7′ S. and longitude 106° 50′ E. (Map: East India Islands, C 6). It lies on the Bay of Batavia in a low and marshy plain, which is mainly devoted to the cultivation of rice. The temperature is warm and approximately uniform. Like most colonial cities, Batavia consists of two parts, the old and the new city. The former is situated near the water, and is occupied chiefly by business houses and factories, and the residences of the natives and Chinese. In former years the Europeans also lived in the lower part of the city; but the excessive mortality from fever compelled them to remove to the upper and more elevated part. The modern city is built in all essentials after the fashion of Dutch towns, with a few modifications to suit the exigencies of the climate. The houses are spacious and wide apart, and are surrounded by luxurious gardens filled with the choicest plants of the tropics. The Government buildings are of magnificent architecture, and add much to the appearance of the city. The Königs-Plein is a parade-ground one square mile in extent and surrounded by the finest public buildings of the city, including the Governor-General's Palace and the Museum of the Batavian Society of Arts and Sciences. The latter is a beautiful structure in Greek style, and contains, besides an extensive library, the largest collection of representative Javanese art in all its branches. The Batavian Society, in conjunction with the Dutch Government, has contributed considerably to the science of archæology by the excavation of the ancient Javanese temples, carried on under its auspices. The military buildings are on a large scale, and not without regard for the æsthetical side. In regard to public utilities, Batavia is in no way inferior to any European city of its size. It has good steam tramways, and electric railways, telephones, electric lighting, and all other accessories of a modern city. Of educational and charitable institutions, there are a gymnasium, a number of Government and private high schools, an orphan asylum, a medical school for natives connected with the military hospital, and a number of scientific societies. Commercially, Batavia is the most important city of the East Indies. It is the chief outlet for the numerous products of the Dutch East Indies, of which the most important are coffee, sugar, tea, rice, different spices, minerals, etc. Batavia stands in direct communication with the Netherlands, Great Britain, Germany, and Australia. There is a State railway connecting the old town with the harbor, and a private line running into the interior. About 36 miles south of the city is the delightful health resort of Buitzenzorg, the residence of the Governor-General.

The first European settlement on the site of the present city of Batavia was founded by the Governor-General, Pieter Both, in 1610. Originally only a factory, it became the chief commercial centre of the Dutch East Indies, under the name of Jacatra, during the administration of the Governor-General, Coen (1618-23), who removed his seat from the Moluccas to the new settlement and erected some fortifications. In 1619 it was attacked by the joint forces of the kings of Bantam and Jacatra, assisted by the English, who were defeated, after a siege of five months, by Governor-General Coen. Since then the city has been known by its present name, and has grown rapidly, becoming, by the end of the Seventeenth Century, the foremost city of the East Indies. After the earthquake of 1699 it became very unhealthful, and the centre of the European population was gradually shifted southward, where the present modern city of Batavia is situated. The population of Batavia in 1897 was 115,567, of whom 9423 were Europeans, 26,433 Chinese, and 2828 Arabs. Batavia is the seat of a United States consul. Consult Conscience, *Batavia* (Paris, 1880).

BATA′VIA. The county-seat of Genesee County, N. Y., 36 miles east of Buffalo, on Tonawanda Creek, and on the Erie, the Lehigh Valley, and the New York Central railroads (Map: New York, B 2). It is the seat of the State School for the Blind, and has a public library, a monument to William Morgan, and the Holland Purchase Land Office, which contains relics of the early history of this part of the State. The village is an important manufacturing centre, producing in considerable quantities agricultural implements, firearms, shoes, and wooden-ware. Population, in 1890, 7221; in 1900, 9180. Batavia was founded by Joseph Ellicott in 1801 and incorporated as a village in 1823. Here lived the William Morgan (see ANTI-MASONS) who is said to have been abducted and probably killed by members of the Masonic Order in 1826, because of his avowed intention to reveal the secrets of Masonry. Consult Seaver, *A Historical Sketch of the Village of Batavia* (Batavia, 1849).

BATCH′ELLER, GEORGE SHERMAN (1837—). An American soldier, jurist, and diplomat, born at Batchellerville, N. Y. He graduated in 1857 at the law department of Harvard University, was admitted to the bar in 1858, and was elected a member of the New York State Legislature in 1859, 1873, 1885, and 1889. During the Civil War he served in the Virginia campaigns, and at the siege of Charleston was appointed deputy provost-marshal-general of the Department of the South, and rose to be lieutenant-colonel of volunteers. In 1875 he became judge representing the United States in the international tribunal of Egypt, of which he was elected presiding justice. Having been, in 1889-90, First Assistant Secretary of the Treasury, and in 1890-92, Minister to Portugal, he was, in 1897, reappointed to the international tribunal.

BATCH'ELOR, George (1836—). An American Unitarian minister. He was born at Southbury, Conn., and graduated at Harvard College, the Divinity School, Meadville (1866), and was secretary of the American Unitarian Association from 1893 to 1897; of the National Conference from 1870 to 1880, and chairman of that body in 1893-94. Besides numerous sermons, published in leading religious and other reviews, he has published a work entitled *Social Equilibrium* (1887).

BATCHELOR'S BAN'QUET, The. A satirical pamphlet by Dekker (1603), doubtless suggested by a Fifteenth-Century French satire, entitled *Les quinze joyes de mariage* (q.v.).

BATCHIAN, bȧt-shyän'. See Batjan.

BATE, William Brimage (1826—). An American soldier and legislator. He was born near Castilian Springs, Tenn., and when a boy was employed as clerk on a steamboat. He served as a volunteer during the Mexican War, and afterwards edited a newspaper at Gallatin, Tenn., where he also began to practice law in 1852. Previously he had been sent to the State Legislature, and from 1854 to 1858 held the office of attorney-general for the Nashville District. He joined the Confederate Army as a private, rose to the rank of major-general, and surrendered in 1865 with the Army of the Tennessee. After the war he resumed the practice of law, and for many years was active in the political interests of the Democratic Party. He was Governor of Tennessee from 1882 to 1886; was elected United States Senator in 1887, and was reëlected in 1893 and 1899.

BATEAU, bȧ'tō'. See Boat.

BATE'MAN, Sir Frederic (1824-1904). An English physician and scientific writer. He graduated at the University of Aberdeen in 1850, and in 1876 was elected Fellow of the Royal College of Physicians. His appointments include that of consulting physician to the Norfolk and Norwich Hospital. His *Aphasia, and the Localization of Speech* (1870) was crowned by the Academy of Medicine of France.

BATEMAN, Kate Josephine (1842—). An American actress. She was born at Baltimore, Md., the daughter of Hezekiah Linthicum Bateman, an actor and theatrical manager. Her mother was also an actress. With her sister, Ellen (later Mrs. Greppo), she appeared on the stage almost in infancy, and exhibited unusual talent. In 1862 she began her career in New York as Julia, Pauline, Juliet, and Lady Macbeth, and made a remarkable success in London in 1863 as Leah. She married George Crowe, the former editor of the London *News*, in 1866, and temporarily abandoned the stage, but returned to it in 1868, making a special success in *Medea* in 1872, and with Henry Irving in *Macbeth* in 1875. The next year she played the title rôle in Tennyson's *Queen Mary*, and afterwards managed one of the London theatres.

BATEMAN, Newton (1822-97). An American educator. He was born at Fairfield, N. J., graduated in 1843 at Illinois College, studied at Lane Theological Seminary, and from 1847 to 1851 was professor of mathematics at Saint Charles College. From 1858 to 1868 he was State Superintendent of Public Instruction for Illinois, and in 1875 was appointed president of Knox College.

BATES, Arlo (1850—). An American author. He was born at East Machias, Maine, and was graduated from Bowdoin (1876). He became the editor of the Boston *Sunday Courier* (1880-93) and afterwards professor of English in the Massachusetts Institute of Technology. Among his novels are *The Pagans* (1884); *The Wheel of Fire* (1885); *The Philistines* (1888); *The Puritans* (1899); and *Love in a Cloud* (1900). His poems are collected in *Berries of the Brier* (1886); *Sonnets in Shadow* (1887); *A Poet and His Self* (1891); *Told in the Gate* (1892); *The Torchbearers* (1894); and *Under the Beech Tree* (1899); his criticisms in *Talks on Writing English* (1897), and *Talks on the Study of Literature* (1898).

BATES, Blanche (1873—). An American actress, born at Portland, Ore. She made her début in San Francisco in a benefit performance of Brander Matthews's *This Picture and That*, and by 1895 was acting leading comedy parts in the Frawley stock company in the West. Among her early successes were her Mrs. Hillary in *The Senator*, Phyllis in *The Charity Ball*, and Nora in *A Doll's House*. She joined Daly's company in 1898, and at Daly's Theatre, New York, early in 1899 made a sensation as Mirtza in *The Great Ruby*. The same season she appeared as Miladi with James O'Neill in *The Three Musketeers*. In 1901 she appeared as Cigarette in *Under Two Flags* at the Garden Theatre in New York City. Consult Strang, *Famous Actresses of the Day in America* (Boston, 1899).

BATES, Charley. A pupil of the Jew Fagin, and companion of the 'Artful Dodger,' in Dickens's *Oliver Twist*.

BATES, Charlotte Fiske (Mme. Rogé) (1838—). An American writer, born in New York City. She has published a volume of verse, under the title *Risks and Other Poems* (1879), has contributed many articles to magazines, and edited the *Longfellow Birthday Book; The Seven Voices of Sympathy* (1881); and the *Cambridge Book of Poetry and Song* (1882). In editing the first-named works she coöperated with the poet Longfellow, whom she also assisted in compiling his *Poems of Places*. In 1891 she married M. Adolphe Rogé, who died in 1896.

BATES, Edward (1793-1869). An American lawyer and statesman. He was born in Belmont, Va., of Quaker parentage; was left an orphan at 12, and was brought up by an elder brother. In 1814 he removed to Saint Louis, Mo., where he studied law in the office of Rufus Eaton, and in 1816 began to practice. He was a member of the State Constitutional Convention of 1820, was successively Attorney-General and District Attorney for his State, and from 1827 to 1829 was a member of Congress. For the next 25 years he devoted himself wholly to his profession, and refused to take any part in public affairs, even declining an appointment to the Secretaryship of War in President Fillmore's Cabinet. He was appointed judge of the Saint Louis land court in 1853, presided over the Whig National Convention in 1853, and subsequently became one of the leaders of the Republican Party. At the national nominating convention in Chicago in 1860, his name was proposed for the Presidency, and he received 48 votes on the first ballot.

From 1861 to 1864 he was a member of Lincoln's Cabinet as Attorney-General, and worked indefatigably to secure the success of the Union cause during the Civil War. Afterwards, until his death, he devoted himself wholly to the practice of his profession.

BATES, Henry Walter (1825-92). An English naturalist and traveler, born at Leicester. He was apprenticed to a hosier of his native town, and afterwards was a clerk at Burton-upon-Trent. His holidays were spent collecting insects with his brothers. He became acquainted with A. R. Wallace, and in 1848 he and Wallace went to the Amazon, paying their expenses by the sale of duplicate specimens. Bates spent three years at Pará and seven years on the Upper Amazon. At Ega, on the Upper Amazon, he found 550 new species of butterflies. He returned to England in 1859, having found 8000 species new to science. Like Darwin, he suffered much from dyspepsia after his return, but published *The Naturalist on the River Amazon* (London, 1863), a work which has become a classic. In his "Contribution to Insect Life of the Amazon Valley: Lepidoptera; Heliconidæ" (*Linn. Soc. Trans.*, Vol. XXIII., London, 1862), he considers the phenomenon of mimicry, and gives a philosophical explanation of it. After reading it, Darwin wrote: "I rejoice that I passed over the whole subject in the *Origin*, for I should have made a precious mess of it." In 1864 he was made assistant secretary of the Royal Geographical Society, a position entailing much executive work, which he administered with great credit. He edited several of the *Transactions*, as well as many books, including Belt's *Naturalist in Nicaragua*. He was elected a Fellow of the Royal Society in 1881. He married Sarah Ann Mason in 1861. A large part of his collections are in the British Museum. Consult *The Field*, London, February 20, 1892.

BATES, John Coalter (1842—). An American soldier, born in Saint Charles County, Mo. He was educated at Washington University in Saint Louis, and joined the Federal Army in 1861 as a lieutenant in the Eleventh Infantry. He was on General Meade's staff from Gettysburg to the close of the war, was made a captain in 1863, and was advanced to the rank of colonel of the Second United States Infantry in 1892. He served for thirty years chiefly in the Indian country, was president of the board which formulated the new drill and firing regulations, and a member of the board that adopted the Krag-Jorgensen rifle for army use. At the outbreak of the war with Spain he was a brigadier-general of volunteers, and he was promoted to the rank of major-general of volunteers during the Santiago campaign. He was military governor of Cienfuegos in 1899, and was ordered in that year to the Philippines, where he conducted the negotiations with the Sultan of Sulu. In April, 1900, he was placed in command of the Department of Southern Luzon.

BATES, Joshua (1788-1864). An American financier, born at Weymouth, Mass. In 1828 he became associated with the great house of Baring Brothers & Co., of London, of which he eventually became the senior partner. He was umpire of the commission convened in 1854 to arbitrate the claims of American citizens arising from the War of 1812. In 1852 he founded the Boston Library by giving $50,000 for that purpose, with the provision that the interest of the money should be expended for books of permanent value, and that the city should make adequate provision for at least one hundred readers. He afterwards gave 30,000 volumes to the institution, the main hall of which has been named 'Bates Hall' in his honor.

BATES, Katharine Lee (1850—). An American author. She was graduated at Wellesley College (1880), taught at Natick, and, after 1885, at Wellesley, where she became professor of English literature in 1891. Among her works may be mentioned: *Rose and Thorn* (1889), juvenile stories; *Hermit Island* (1891), a story for girls; *The College Beautiful and Other Poems* (1887); *The English Religious Drama* (1893); *A History of American Literature* (1898); and *Spanish Highways and Byways* (1900). She has also edited many texts for schools.

BATES, Samuel Penniman (1827-1902). An American educator and writer, born in Mendon, Mass. He graduated at Brown University in 1851. In 1860 he was made deputy State superintendent of schools, and in 1866 State historian. His numerous lectures and reports did much to further the cause of education. He published *Lectures on Moral and Mental Culture* (1859); *Lives of the Governors of Pennsylvania* (1873); *Life of Gen. O. B. Knowles* (1878); *History of the Battle of Gettysburg* (1878); and *History of the Battle of Chancellorsville* (1882).

BATE'S CASE. At the beginning of his reign, James I. of England, following the bad example set by Mary and Elizabeth, laid duties or 'impositions' on certain goods, including currants and tobacco, without securing a Parliamentary grant. In 1606 John Bate, a London merchant and member of the Levant Company, refused to pay these charges on a cartful of currants, and was promptly committed to the Marshalsea for contempt of the King's officers. The Commons sided with Bate; but the King's 'sole prerogative' to levy impositions on exports and imports was declared by a unanimous decision of the barons of the Court of Exchequer. An unconstitutional practice was thus sustained by a decision which is generally regarded as wrong. The Bate Case is, therefore, an incident of great historical significance, marking the beginning of the long and bitter struggle with the Stuarts to maintain the constitutional right of Parliament to grant all supplies. Consult: Green, *History of England*, Vol. II. (New York, 1879); and especially Gardiner, *History of England*, Vol. II. (London and New York, 1889).

BATES COL'LEGE, situated at Lewiston, Maine. It was organized in 1863, as an outgrowth of the Maine State Seminary, founded 1855. In 1901 the faculty numbered 21, and the students 330, of whom 280 were studying for the A.B. degree. The college has an endowment of $370,000, and buildings and grounds valued at about $300,000. The library numbers some 24,000 volumes. Bates was the first college on the Atlantic seaboard to provide for the higher education for women. The tone of the institution is moral and religious, and a large number of its graduates have become educators and ministers.

BATESVILLE, bāts′vĭl. A city and county-seat of Independence County, Ark., about 114 miles by rail northeast of Little Rock, the State capital, on the White River, and on a branch of the Saint Louis, Iron Mountain and Southern Railroad (Map: Arkansas, D 2). It is the seat of Arkansas College (Presbyterian), opened in 1872. The city has transportation facilities also by water, as the White River is navigable for a considerable portion of the year, and extensive improvements in a system of locks and dams, estimated to cost $1,600,000, are being made by the Federal Government to insure permanent navigation for a distance of about 100 miles above Batesville. It has inexhaustible quarries of sandstone, limestone, and marble; makes large shipments of building-stone, cotton, and lumber; and manufactures flour, lumber products, carriages, wagons, etc. Population, in 1890, 2150; in 1900, 2327.

BAT′FISH. (1) One of the small, pediculate fishes of the family Malthidæ, related to the angler or fishing-frog. The commonest American species is *Malthe* (or *Ogcocephalus*) *vespertilio*, which is grayish brown above, covered with bony tubercles, and reddish below, and abounds in the warmer regions of the Atlantic, where it sits on the bottom, supported by its fins, much in the attitude of a toad. Its remarkable abnormality arises from the excessively large and broad head compared with the short, slender trunk and the leg-like form of the pectoral fins. It is regarded as venomous by the ignorant. It has curious relatives in the deep sea. For illustration, see plate of ANGLERS AND BATFISH. (2) One of the sting-rays of the Pacific Coast (*Myliobatis Californicus*). See RAY. (3) A flying-fish (q.v.). (4) A flying gurnard of the Atlantic (*Cephalacanthus spinarella*). See GURNARD.

BAT TICKS. See FOREST FLY.

BATH bäth. By bathing is usually understood the immersion of the body, or a part of it, in water. In a more extended signification, it means the surrounding of the body with any medium differing in nature or temperature from its usual medium; thus we speak of a vapor-bath, a cold-air bath, an earth-bath. A fourfold division may be made of baths: (1) According to the substance with which the body is surrounded, whether liquid, gaseous, or mixed, water, oil, wine, milk, blood, gas, sand, mud, and other baths; (2) according to the manner of application—into river, plunge, shower, dropping, vapor, electric, and douche baths; (3) according to the parts of the body subjected to the application—into whole, half, sitz, foot, and eye baths; and (4) according to the temperature of the substance applied—into cold, tepid, warm, and hot baths.

The most ancient historical accounts as well as popular myths make mention of bathing. Among the Egyptians the bath was practiced as a religious rite; and in general we find the opinion prevailing, throughout antiquity, that purification of the body symbolized moral purity. In making the bath a religious ordinance, Moses may have had in view the prevention or more speedy cure of those skin diseases so prevalent in the East. The Mosaic law prescribes expressly, in some cases, the use of running water, which has given rise, through a misunderstanding, to the deleterious cellar baths of the Jews. In Palestine the wealthier Jews had private baths in their houses, and ponds in their gardens —an arrangement which prevailed in all the civilized parts of the East, and does so still. There were, besides, public bath-houses among the Jews, as among other nations.

GREECE. Among the Greeks, also, bathing was very early in use. A bathroom containing a clay tub was found in the prehistoric palace at Tiryns, and in Homer the warm bath is frequently used for refreshment, and is part of the entertainment offered an honored guest. Bath-tubs, for which water was heated, were used, and the washing was followed by an anointing with oil. Bathing among the Greeks was a religious rite, and was connected with the preparations for sacrifice, for the reception of oracles, for marriage, etc. It was at Athens that the luxury of warm baths was especially developed, after the Fifth Century B.C. There were public baths where a slight fee was required; baths run by private enterprise, at higher rates; baths in the wealthy private houses; and others connected with the gymnasia. The Athenians knew the vapor, hot, plunge, and douche baths preceding the cold baths. Allusions in the ancient writers, as well as the vase-paintings, show that the bathers frequently stood beside a large basin on a high stand. We also find men and women bathing under douches, the water pouring from spouts in the wall. There were swimming-baths for each sex, but there is no reason to believe that the later Roman custom of promiscuous bathing ever prevailed in Greece. The baths never reached such splendor of construction or such importance in the daily life of the Greeks as they did in that of the Romans.

ROME. Among the Romans the public baths were long the only ones in use, and consisted of but two halls, one for each sex. Every town and even village had one bath or more. In Rome itself there were over 800 in the Fourth Century A.D. This number does not include the magnificent imperial *thermæ*, which were much more than baths; nor the private baths, without which no house of any pretensions was complete. Orata, about a century before Augustus, was the first to make a bathroom over a *hypocaust*, or basement filled with hot air—a discovery which was developed into a system of hot-air pipes throughout the thickness of all the walls, giving an even, hot temperature. Probably the increase of comfort due to this invention was the cause of the growth in both the number and the popularity of baths toward the close of the Republic. Mæcenas was the first to have a swimming-tank of hot water, and the other friend of Augustus, Agrippa, was the first to build immense thermæ on an elaborate and systematic plan, with all the luxuries of Græco-Oriental tradition improved by Roman practical inventiveness. The type of the Augustan Age can be studied in the descriptive text of the Roman architect Vitruvius. The later imperial thermæ became the centre of the public leisurely life of Rome, including as it did libraries, lecture-rooms, gardens, porticoes, .gymnasia, running-tracks, and every variety of incentive to luxurious ease. The principal imperial establishments of this kind were those of Titus, Trajan, Caracalla, and Diocletian. They covered enormous spaces in the heart of the city

The system of bathing in all the various classes of bathing establishments was fundamentally the same, except when special treatment was prescribed by medical advice. Galen recommended the following succession: (1) hot-air bath in laconicum; (2) hot-water bath; (3) cold bath; (4) massage. That other great physician, Celsus, recommended: (1) sweating, dressed, in tepidarium; (2) sweating, disrobed, in calidarium; (3) douche bath, first hot, then tepid, then cold; (4) scraping, rubbing, and anointing. The essential parts of the bathing establishments were: (1) a vestibule for loungers, servants, and attendants, and sometimes an atrium; (2) an undressing-room, or apodyterium, though often the bathers undressed in the larger bathing-rooms; (3) the frigidarium, or hall for cold baths, with a sunk basin at one end or in the centre, often large enough for a swimming-tank; often the bathers contented themselves with the cold bath; (4) the tepidarium, a hall not used for bathing, but kept at a moderate temperature to serve as transition between the hot and cold bathrooms, used for dressing and undressing, anointing and waiting; it was fitted out with a sunken tank for hot water at one end, and a raised basin at the other for cold water; (5) the calidarium, or hall for hot baths; under it was the hypocaust, or hollow floor filled with hot air from the furnace, which was conveyed also into the hollow walls around the calidarium. With the furnace were connected three boilers, the lower one containing hot water, the middle one warm, and the upper cold water, so connected by pipes that when hot water was drawn off from the lower boiler it was replaced by tepid water from the one above, and that again by cold from the uppermost. The scraping off of the perspiration by strigils, and the anointing with oil, which at first took place in the calidarium, were afterwards transferred to the tepidarium, or to a special hall called the unctorium, the last hall toward the exit. Connected with the calidarium was the laconicum, or sweating-room.

There are many remaining examples of Roman baths of the various classes. Those at Pompeii form the most interesting and varied group outside of Rome. That of the Villa of Diomedes shows the type followed in the wealthy private house (open-air bath; dressing-room; frigidarium; tepidarium; calidarium); the public ancient baths, which show two complete sections, one for each sex, show the normal plan of the age of Vitruvius, before the development of the elaborate imperial thermæ. One of the best preserved of these public baths of moderate size is in Germany, at Badenweiler, also with its two sex-divisions, perhaps the most interesting example of their perfectly symmetrical arrangement. Special arrangements are, of course, to be found in famous curative thermal establishments, such as those at Baiæ. The most monumental ruins of Roman baths are those of Caracalla and of Diocletian, whose tepidarium was transformed by Michelangelo into the Church of Santa Maria degli Angeli. It was an immense hall 300 feet long and 92 feet wide, covered with a groin vault in three compartments. The halls of Caracalla's thermæ, though not so large—the tepidarium being 170 × 82 feet — were better proportioned and more artistic in decoration. These thermæ had a profusion of marble columns, surface decoration of rich marble slabs, coffered ceilings, rich cornices, mosaic floors, a wealth of decorative statuary and paintings.

The process of bathing was usually as follows: After undressing in the apodyterium, the bather was anointed in the elæothesium with oil, and then proceeded to a spacious court devoted to exercises of various kinds, among which games at ball held a prominent place. After exercise, he went through the tepidarium into the calidarium to sweat and take a hot bath; he then returned to the frigidarium, took a cold bath, and returned to the calidarium or laconicum for another sweat. He was then rubbed and anointed by the attendants, and resumed his clothing. Sometimes the bather went at once to the hot-room, and followed the sweat with a cold plunge and a rubbing and anointing.

The public baths for women were much frequented, even by the most respectable. The women bathed in company, like the men. When there were no baths for women, they seem to have had the exclusive use of the public baths at special hours. At Rome the great baths were for men only, but were frequented by dissolute women. The irregularity of men and women bathing together is also alluded to by ancient writers, and was legislated against by several emperors. In later times, the baths in general became the scenes of all sorts of debauchery, as was the case at Baiæ.

The Orient. The barbarian invasions and wars finally put an end to Roman culture in the West in the Sixth Century A.D., and with its fall the sumptuous baths were abandoned. There were still baths on a small scale in connection with churches and monasteries, and the sacrament of baptism preserved the religious symbolism of the bath. The habits of monasticism and of asceticism combined, however, with northern rudeness in discouraging the luxurious aspects of bathing. It was not so in the East, for the Byzantine Empire continued in this as in most respects the traditions of Rome; and life in Constantinople, in the time of Justinian and Theodora and their successors, was no less pleasure-loving than it had been in Rome. The Byzantines preserved there, for eight centuries more, all the various processes of Roman bathing, and initiated into them the conquering Arabs when, after founding the Caliphate of Bagdad and the great kingdoms of Egypt and Spain, the Mohammedans adopted all the traditions of advanced civilization around them. From the Eighth Century to the present day, all the Mohammedan cities of the East have been provided with public and private baths on a large scale. The baths at Broussa, for example, show how the main divisions of the Roman bath—frigidarium, tepidarium, and calidarium — had been handed down unimpaired. A typical city, Adrianople, had some years ago twenty-two public baths. The private houses at Cairo, Damascus, and other cities show how common it has been for the wealthy Orientals to have baths. The peculiarities of the Russian bath were also inherited through the Byzantines. The reason for this was both religious and sanitary.

Turkish Baths. Islam enjoins on the believer the careful preservation of corporal purity, and for this purpose prescribes repeated daily ablutions. Besides these, certain circumstances and times make the use of the bath ritually obligatory on both men and women. For this end, not only did the rich erect splendid baths in their houses and gardens, but bath-houses for the people in general were established in every town in which there was a mosque. The public baths of the Turks of the present day are a copy of those ancient Arabian baths. The construction of those Oriental baths, imitations of which are now to be found in most cities, is as follows: The building is of stone; the bathrooms have a floor of marble, which is heated from below, and tubes in the walls conduct the heat in all directions. The bather undresses, wraps himself in a sheet, puts on wooden slippers, to protect him from the heat of the floor, and enters the bathroom. Here a general perspiration soon breaks through the skin, which is washed off with cold water. The body is then rubbed with woolen cloths, and smeared with a soap or salve beneficial to the skin. This is generally accompanied by the operation of 'kneading.' The bath attendant stretches the bather on a table, pours warm water over him, and manipulates and scrubs his whole body. He then dries the body with a haircloth, rubs off the hard skin of the feet with pumice-stone, anoints the bather with soap and perfumes, and finishes by cutting his hair and beard. This treatment lasts some three-quarters of an hour. After bathing, people repose in a cooler room, stretched on couches, and finally partake of coffee, sherbet, or lemonade.

EUROPE. In England, France, and Germany, public establishments for bathing were long unknown. It was during the Crusades, which brought the East and the West into contact, that Europeans first became acquainted with the baths of the Asiatics; and the want of such institutions came to be more sensibly felt from the leprosy and other skin-diseases which intercourse with Asia introduced into Western Europe. The evil was at first sought to be met by establishing hospitals, but as these were found insufficient, baths and bathrooms were erected, which gradually became public establishments. Still, very little has been done to bring back the antique millennium until this century. It was not until the Eighteenth Century that the custom of sea-bathing and mineral-water bathing began in England, followed by Germany at the close of the century, and by Italy and France early in the Nineteenth Century. Even then nothing was done for the general public. It was not until c.1840 that private associations first established public baths with a small admission fee in England. Success was followed by legislative encouragement and regulation. In 1846 and 1847, and again in 1878, facilities were afforded by law to municipalities and rural parishes throughout Great Britain to establish public baths with three classes of bathers, at 2, 4, and 8 pence. It is interesting to note that the financial subsidy annually offered by the French Government from 1851 to 1862, in rivalry of England, to the communes throughout France that would establish public baths, met with no response whatever, and had to be withdrawn. Italy is even worse provided than France with baths available to the public in the cities. It is only in the largest and most expensive sanitariums, or in the foremost watering-places, that the advantages formerly available to every Roman can be secured by the wealthy few.

RUSSIA. Besides the kinds of baths already described, there are now to be found in the larger cities of Europe and America, generally in connection with water-baths, an improvement upon the vapor-baths which have been long in common use in Russia. The Russian bath consists of a small apartment built of wood, with broad benches running round it, on which the people lie undressed. By throwing water upon glowing hot pebbles, a dense hot steam is produced which envelops the bathers, and throws them into such a heat that the perspiration breaks out over the whole body. In this atmosphere of steam, the thermometer often rises to 112°-140° F. After they have sweated for some time, and from time to time cooled themselves again, by having cold water poured over them, the skin is rubbed with soap, and with towels made of inner bark, or with brushes; they are flogged with softened birch-twigs, and then washed with tepid, and afterwards with cold water; and at last have cold water dashed over them. A bather will also go direct from the sweating-bath and plunge into a river or a pond, or roll himself in the snow. These baths are a necessity in Russia, and are to be found in every village. The German vapor-bath differs in this, that the steam is produced in a boiler, and that the bather remains for some time in an adjoining room of moderate temperature, wrapped in blankets, to allow the perspiration to go on, and the blood to become calm. A ruder kind of sweating-bath, in a hole in the earth, or in a baking-oven, is practiced among many nations; among the Finns, the natives of Mexico and South America, and others.

THERAPEUTIC BATHS. As regards detergence, the *Vapor Bath* is the only kind of bath that is really effectual. If the skin is exposed to the action of hot water-vapor, the scurf becomes softened and loosened, and is more easy to remove by simple rubbing. In the vapor-bath, as in the Turkish bath, in which dry heat is used, the person is cooled by having tepid or cold water dashed upon him. The vapor-bath is useful in certain diseases of the skin and kidneys, as well as in chronic rheumatism. Its temperature is usually over 99° F.

The cold sponge-bath is useful as a daily tonic to most people. It is a stimulant to nutrition, circulation, and nerve-action. It should be brief and followed by brisk friction with the towel. By exhausted, and generally by aged, as well as by thin, nervous, and sensitive persons, cold baths should be avoided, and tepid ones taken instead. A bath in the sea is productive of good in most cases in persons of good physique. In typhoid the cold bath has lowered the mortality from about 18 per cent. to about 5 per cent. Wrapping a patient in a wet sheet, and then covering with a blanket (the 'wet pack'), is sometimes substituted for the cold bath. The hot bath is stimulant, relieving pain and limiting inflammation, controlling convulsions, and inducing sleep. It is useful also in some diseases by causing sweating. At sanitariums and bathing establishments, salt-rubs, electro-chemical, electro-thermal, and other baths are given. The *Roman Bath* consists of an application of oil or vaseline, with massage.

A *Medicated Bath* is one in which some substance intended to act as a medicine has been mixed with the liquid. This is an ancient and almost obsolete method of bringing remedies to bear upon the system. The mineral substances used were common salt, chloride of lime, nitric acid, corrosive sublimate, the hydroxides and carbonates of sodium and potassium, ashes, soap, iodine, sulphur, iron, etc.; the vegetable were wine, vinegar, solutions of essential oils, infusions of thyme, rosemary, lavender, wormwood, willow, oak, and Peruvian bark, etc. Such animal substances as milk, blood, bouillon of meat, etc., are also sometimes employed for baths, with a view to imparting nourishment, but that any is taken up into the system is denied. *Mercurial Baths* are used in syphilis. They are baths in which vapor of mercury is applied to the whole surface excepting the head. The application must be made in a fumigating-box, in which the body alone is inclosed along with the vapor, in order that the respiratory organs may not be incommoded. Another species of vapor baths is what is called an *Animal Bath*, which was used by the ancients, and was in great reputation in cases of lameness. Either the whole body of the patient was wrapped in the skin of a newly slaughtered animal, or an opening was made, and the diseased limb inserted into the breast or belly of the animal while yet alive, or into the newly drawn blood. Sometimes smaller animals were killed, split up, and immediately applied to the diseased part. Of *Gas Baths*, the most generally used are those of sulphureted hydrogen and carbonic-acid gas, which are to be had at certain mineral springs. In recent times, at Ischl and other places, the vapors that arise from the mineral springs loaded with saline particles are received in close rooms, in which the patients walk about and allow the vapors to act upon the lungs and skin. See BATH-HOUSES, MUNICIPAL; and HYDROTHERAPY.

The terms *water-bath* and *sand-bath* have been adopted in chemistry to signify a contrivance by which vessels are heated without being brought into immediate contact with the flame, but receive their heat through the medium of hot water or sand.

BATH, bâth (Celt. *Caer-badon*, city of baths, AS. *Bathan*, *Bathum*, short for *æt thæm hātum bathum*, 'at the hot baths'; the Roman *Aquæ Solis*, 'baths of the sun'). The chief city of Somersetshire, England, beautifully situated in a wooded valley, inclosed on the north and east by a high range of hills, on the Avon (which is crossed by numerous bridges), 20 miles from its mouth, and 106 miles west by south of London (Map: England, D 5). The houses are built of white freestone—'Bath Oölite'—worked in the neighboring quarries. The city has a finer appearance than any other in England, the variety of levels giving commanding sites for its fine and regular streets, crescents, and public buildings. The beauty and sheltered character of its situation, the mildness of its climate, and especially the curative efficacy of its hot chalybeate springs, have long rendered Bath a favorite fashionable resort. The springs, which are four in number, were known to the Romans, who built baths on the spot in the First Century, and of which extensive remains were discovered in 1775. The temperature of the springs varies from 116° to 120° F.; they rise near the river bank, in the centre of the city, and discharge more than half a million gallons of water daily. The water is most useful in bilious, nervous, and scrofulous complaints, palsy, rheumatism, gout, and cutaneous diseases. Bath has many handsome public buildings, first among them being the Pump-Room, inclosing some of the springs; the Guildhall, containing in addition to the municipal offices, technical schools, an art gallery and reference library; and the Royal Literary and Scientific Institution, containing several fine scientific collections and a library of over 20,000 volumes. The Abbey Church is a cruciform building in the Perpendicular style, dating from the Sixteenth Century. It has a central tower 162 feet high, and on account of the number and size of its windows has been called the 'Lantern of England.' There are several fine parks, including the Victoria Park of about 50 acres, containing a botanical garden, handsome assembly rooms, and an excellent theatre. The city obtains an excellent water-supply from springs in the surrounding hills. It is well lighted by electricity, which the corporation supplies. It also maintains public baths and markets. Bath is amply supplied with educational facilities. In addition to the technical school maintained by the corporation, there is a grammar school founded by Edward VI., Bath College, a school for officers' daughters, and Wesleyan College. Its charitable institutions include numerous hospitals and an eye and ear infirmary. Its three railway lines, and the Kennet and Avon Canal connecting the city with the Thames River, furnish excellent means of communication. It is a parliamentary borough, and sends two members to Parliament. Bath was a royal residence in Anglo-Saxon times. Richard I. and Edward III. granted it many privileges. In the Eighteenth Century Richard Nash (q.v.) made it the most fashionable resort in England. Population, in 1891, 51,900; in 1901, 49,800. Consult: "Municipal Roman Baths at Bath," in *Municipal Journal*, Vol. VIII. (London, 1899); Bath Committee, *Handbook to Bath* (Bath, 1900); Perkins, *The Abbey Churches of Bath, Malmesbury,* etc. (London, 1901).

BATH, bâth. A city, port of entry, and the county-seat of Sagadahoc County, Maine, on the Kennebec River, 12 miles from the sea, and 30 miles south of Augusta (Map: Maine, D 8). It is on the Maine Central Railroad, and has steamboat connections with Boston and Portland. Ship-building is the main industry, and several vessels for the United States Navy have been built here. There are also brass and iron foundries, machine-shops, boiler-works, and manufactures of lumber, oilcloth, woolen goods, etc. Bath contains a public library, a soldiers' and sailors' orphans' home, and two homes for aged persons. The charter, adopted in 1847 and revised in 1899, limits the mayor's term to one year, and provides for a bicameral city council. The majority of administrative officers are elected by the city council, though the mayor exercises some appointive power, subject to the consent of the board of aldermen. The superintendent of schools is chosen by the school committee, which is elected by the people. Population, in 1890, 8723; in 1900, 10,477.

The first settler within the present limits of Bath was probably Robert Gutch, a missionary to the Indians, about 1660. In 1781 the settlement was incorporated as the town of Bath, and in 1847 a city charter was secured. Consult Reed, *History of Bath and Environs* (Portland, 1894).

BATH. A village and county-seat of Steuben County, N. Y., 75 miles south-southeast of Rochester, on Cohocton Creek, and on the Lackawanna, the Erie, and the Bath and Hammondsport railroads (Map: New York, C 3). It contains the Davenport Public Library, Davenport Orphan Asylum, the New York State Soldiers' and Sailors' Home, two parks, a soldiers' monument, and the various county buildings. The principal industries are agriculture, lumbering, wine storage, and the manufacture of sashes and blinds, harness, shoes, etc. Settled as early as 1793, Bath was first incorporated in 1836. The government, under a charter of 1895, is vested in a mayor, annually elected, and a village council. Population, in 1890, 3261; in 1900, 4994.

BATH, bȧth, Earl of. See Pulteney, William.

BATH, Order of the. The name of the largest English Order, and the highest to which a commoner can attain. Its name was evidently derived from the initiatory ceremony of bathing, which used to be practiced at the installation of a knight, as an emblem of the purity henceforth required of him by the laws of chivalry. It is asserted by Froissart that in 1127 Henry I. made Geoffrey of Anjou and five others 'Knights of the Bath,' and Burke relates that Lord Willoughby received 'knighthood by bathing' from Edward II. The last creation of Knights of the Bath in the ancient form was at the coronation of Charles II. in 1661. From that period till the accession of the House of Hanover, the Order fell into oblivion. It was revived by George I. in 1725, and is now the second Order in rank in England, the first being the Garter. The Order was military till 1847, when it was placed on its present footing by the admission of civil knights, commanders, and companions. As constituted at present, the Order comprises three classes — Knights Grand Cross (G.C.B.), Knights Commanders (K.C.B.), and Companions (C.B.), the latter two including both civil and military members. In 1902 there were 117 knights of the first class, 302 of the second, and 1106 of the third.

BATH BRICK. A name applied to bricks made for scouring purposes. Bath bricks were originally made from the silt deposited by the high tides along the Parret River, England, but are now also made in the United States. Fine sharp sand is employed as the scouring agent. See Brick: Abrasives.

BATHGATE, bȧth′găt. A town in the centre of Linlithgowshire, Scotland, 17 miles west-southwest of Edinburgh. The old town lies on a steep slope, and the new on a more level site. The celebrated gas-coal called Torbanehill mineral is worked here. Bathgate has paraffin and paper works, but mining is the chief occupation of the inhabitants. Population, in 1871, 6942; in 1901, 6786. In 1668 King Charles II. granted Bathgate a charter, since which time it has been a free burg of barony. In the vicinity is the site of an ancient castle, which Margaret, daughter of Robert Bruce, brought as a part of her dowry to her husband, Walter, great steward of Scotland, who died here.

BATH (băth) **HOUS′ES,** Municipal. The first modern publicly owned baths were established in Germany, while Liverpool was the first modern European city to construct inclosed bath-houses with appliances for furnishing both hot and cold water. This was in 1842, and since that time, authorized and aided by parliamentary legislation, the movement in favor of public baths has rapidly spread in Great Britain, especially during the last decade of the Nineteenth Century, until now every borough with a population of over 50,000 has municipally owned bath-houses, and very many smaller cities are well supplied with such facilities. The cities of Continental Europe do not possess so many public baths. In 1900 Germany had municipal bath-houses in 45 of its cities having a population of over 50,000. France has fewer, and in Austria, Norway, and Sweden, baths have been erected only in the larger cities. Vienna has 11 such establishments. In Russia they are very common, even in the smaller villages, being deemed absolutely essential to health. The city of Tokio, Japan, is said to contain 1000 public bath-houses. The movement in favor of municipal baths scarcely began in America until the close of the Nineteenth Century, when not more than ten or a dozen cities possessed them. Yonkers, N. Y., appears to have been the first American city to establish a public bath with hot and cold water, and to keep it open all the year round. It was opened September 3, 1896, and two years later another bath-house was constructed of fire-proof brick, at a cost of $8586, affording accommodation for 400 baths daily. Newark, N. J., opened a bath-house on July 29, 1895, and a second one in 1897, but neither of these was open the entire year until 1898, and they were closed one month in 1899 through lack of funds. In 1900 Newark appropriated money for a third bath-house. The movement for public baths in Boston dates back to 1866, when the first one was opened; but until 1898 only beach baths, open a few months in the year, had been furnished. The Dover Street bath-house provided during its first year of operation—1898-99—baths for 300,000 people, about 30 per cent. of whom were girls and women. During 1900 the first municipal bath in New York City, situated in Rivington Street, in a densely crowded section, was built at a cost of $100,000. It has 67 spray-baths capable of furnishing 3000 baths per day, allowing each bather 20 minutes. New York is the first American State to enact legislation making the erection of public baths compulsory. In 1895 a law was passed that all cities having a population of more than 50,000 should establish and maintain such free public baths as the local board of health might deem to be necessary, and that any city or village having less than 50,000 inhabitants might loan on its credit or appropriate of its funds for this purpose. The baths must be open 14 hours a day, and both hot and cold water must be provided. The maintenance of river, lake, or ocean-front baths is not to be considered a compliance with this act. The first bath-house erected under the act was opened in Buffalo in 1897. The Rivington Street Bath, New York City, described above, was also built under this act. Albany, Rochester, and Syracuse have built bath-houses since the law was passed, and Troy adopted plans for one in 1900.

Brookline and Worcester, Mass.; Providence, R. I.; Pittsburg, Pa.; and Chicago, Ill., have also provided municipal baths open all the year. At the Brookline baths, instruction in swimming is given as a part of the regular course in the public schools.

Great wisdom should be exercised in selecting a site for a municipal bath-house, in order that it may accommodate as many as possible of those who most need it. The criticism has been made against English bath-houses that they are so situated and their appliances are so elaborate that they are chiefly patronized by a class who can well afford a private bath. A. Hessel Tillman, in a paper read before the Royal Institute of British Architects in February, 1899, emphasizes this fact, and proposes that a municipal bath department should embrace three types of bathing establishments: (1) The central establishments, containing swimming-pools for both sexes, as well as tub, shower, and hot-air baths; (2) the district bath and wash houses, to be much smaller, much nearer together, and located in the poorest and most crowded districts, each building containing not more than 50 shower baths, and from 30 to 50 washing compartments; (3) the people's baths, very small buildings, consisting of a series of double cells 6 × 3¼ feet, serving as dressing and washing compartments, the aim being to provide, in the simplest and cheapest manner, baths for the most crowded districts. The question whether or not a fee shall be charged is one much discussed by the advocates of municipal baths. It is contended that a slight fee encourages self-respect, and, on the other hand, that the establishment of even a small fee will debar that class who most need the baths. Many municipal baths, requiring fees, have free days, and make no charge for school children.

The modern appliance known as the 'rain' or 'shower' bath has done much to simplify the operation of the modern municipal bath-house. It requires less space, less water (11 instead of 50 or 60 gallons), and less attendance, and is therefore cheaper. It is also more sanitary, because cleanliness of the compartment is more easily maintained, and there is no danger of infection from the preceding occupant of the bath. There is also less danger that the bather will take cold.

A recent extension of free baths is their introduction into the public schools. This movement, like that for municipal baths in general, began in Germany, being established by Professor Flügge and Mayer Merkel in the schools of the German university town of Göttingen in 1885. Boston has introduced the institution into this country by constructing a number of public baths in the Paul Revere School, in the north end of the town, in 1900. It is proposed to extend the system to other Boston schools. Much is to be said in favor of this plan, where the school children come from the more crowded and unsanitary quarters, as attempts to keep school air pure by means of the most complicated appliances for ventilation will be futile until a higher standard of personal cleanliness is secured among certain classes of school children.

BATH′-KOL′ (Heb., daughter of the voice, from *bath*, daughter + *kol*, voice). An expression which signifies simply a sound, and which is also used to designate an echo. Its specific application, however, in Rabbinical theology is to a manifestation of the divine will by means of a voice distinctly heard and announcing an order on the decision of some disputed point. It corresponds, therefore, to an oracle, only that the source of the voice is regarded as hidden. This usage of the term reverts ultimately to such a phrase as is found in Daniel (iv. 31): "A voice fell from heaven." Similarly in the New Testament, heavenly voices are referred to at the baptism of Jesus (Matt. iii. 17; Mark i. 11), at His transfiguration (Matt. xvii. 5; Mark ix. 7; Luke ix. 35), before the Passion (John xii. 28), and in the same way Paul and Peter hear voices from heaven. According to the views expressed in the Talmud, Bath-Kols were sent to Israel from time to time throughout its history, and numerous examples are instanced, and in theory such 'voices' were regarded as decisive factors after the extinction of divine prophecy in Israel. So it is reported that, as late as the days of Hillel and Shammai, the differences between these two schools of interpretation of the Jewish law were decided by a Bath-Kol in favor of Hillel (Berichoth 3b). In general, however, the tendency developed not to be guided by supposed 'voices,' and so that Bath-Kol came to be practically a term indicating the decision of a disputed question by rabbis whose authority was recognized. Consult: F. Weber, *Jüdische Theologie*, 2d ed. (Leipzig, 1897); Hamburger, *Real-Encyklopädie für Bibel und Talmud*, II. s. h. v. (Strelitz, 1883).

BATH (bȧth) **MET′AL.** An alloy of 9 parts of zinc to 32 of copper.

BATH′OLITE, Bathylite, Bathylith (Gk. *βάθος*, *bathos*, depth, or *βαθύς*, *bathys*, deep + *λίθος*, *lithos*, *stone*). A great, poorly defined mass of plutonic rock that affords evidence of having been formed far within the depths of the earth's crust during early periods of geological time, and of having attained its present condition of exposure at the surface through the agency of erosion. Such masses are common among rocks of the Achæan or pre-Cambrian Age, and often measure miles in extent. Evidence of the deep origin of batholites is furnished by the coarsely crystalline texture of the constituent rocks—a structure produced only by slow cooling and solidification at great depths in the crust. This hypothesis is also confirmed by the fact that such batholites appear to have been fused from below upwards, and to have incorporated within their mass portions of the overlying and surrounding rocks. See Igneous Rocks; and Pre-Cambrian Formations.

BATHOM′ETER, Gk. *βάθος*, *bathos*, depth + *μέτρον*, *metron*, measure). An instrument invented by C. Williams Siemens, for indicating the depth of the sea beneath a passing vessel. The density of sea-water is about 1.026, while that of solid earth or rock has an average of about 2.75. Hence, the attraction of the water which lies beneath the ship is less than that which would be exerted by earth or rock occupying the same relative position, and the greater the depth of water, the less the attraction. The weight of a given mass on board the ship will be greater, therefore, when the ship is in a harbor or in shallow water than when on the deep sea by an amount which may be determined by an instrument of sufficient delicacy, and this change in weight becomes a recognizable function of the depth of water. Dr. Siemens filled with mercury a vertical steel tube of small bore, fitted below with a cup-shaped expansion closed with a corrugated steel-plate diaphragm. The pressure of the mercury upon the upper surface of the diaphragm is opposed by a plate adjusted to bear upon the centre of its upper surface, and this plate is supported by steel spiral springs, which are attached to the top of the column. In the construction of the instrument, care was taken to compensate for the variations caused in the density of the mercury and in the elasticity of the steel springs by change of temperature. The pressure of the mercury in the diaphragm causes an extension of the steel springs by an amount depending on the force of attraction acting on the mass of the mercury. This extension of the spring is so magnified by a micrometer screw that the apparatus indicates a change of a fathom in depth of water for each division on the scale of the micrometer.

BÁTHORY, bä'tō-rē. A noble family of Hungary. Stephen Báthory (born 1522) was elected Prince of Transylvania in 1571, and King of Poland in 1575. He married Anna, sister of the last of the Jagellons of Poland. He introduced reforms in the administration of Poland, and waged war successfully against Russia. His right hand in the government of Poland was the distinguished statesman, Zamojski. Stephen died in 1586. His brother, Christopher, was Prince of Transylvania from 1576 to 1581. He was a friend of the Jesuits, by whom his son and successor, Sigismund Báthory, was instructed. The latter, in 1595, married a daughter of the Archduke Charles of Styria, an uncle of Rudolph II. In 1598 he transferred the principality of Transylvania to Rudolph, as he intended to enter the priesthood. He soon regretted his renunciation of the territory, however, and while the Imperial commissioners were still negotiating the terms of acceptance, suddenly appeared disguised at Klausenburg and arrested them, sending Bocskay to Prague to pacify the Emperor. He was compelled to resign in 1602, and died at Prague in 1613. Gabriel Báthory, a son of Stephen, King of Poland, was elected Prince of Transylvania in 1608. In consequence of his cruelty, the magnates of his realm, as well as the Saxon element of the country, rose against him, and during the war which ensued he fled to Grosswardein, where he was murdered, October 11, 1613. Elizabeth Báthory, niece of Stephen Báthory, King of Poland, is celebrated as a type of fiendish cruelty. She is said to have slaughtered 650 young girls, in whose blood she used to bathe, to increase the fairness of her skin. She died in prison in 1614.

BA'THOS (Gk. βάθος, depth). A term employed by critics to designate a ludicrous descent from a lofty thought to a mean one, or a sinking below the ordinary level of thought in a ridiculous effort to aspire. (See Anti-climax.) A good example of bathos is the well-known couplet:

> And thou, Dalhousie, the great god of war,
> Lieutenant-colonel to the Earl of Mar.

Consult Pope, "The Art of Sinking in Poetry," in the *Scriblerus Papers* (London, 1729).

BATH'SHEBA (Heb. *bath*, daughter + *sheba*, oath: 'daughter of an oath'). (1) The wife of Uriah, and afterwards mother of Solomon. (2) The name under which Charles II.'s mistress, the Duchess of Portsmouth, appears in *Absalom and Achitophel*, a satire by Dryden. (3) The heroine of Thomas Hardy's *Far from the Madding Crowd*.

BATHS OF CAR'ACAL'LA. See Caracalla, Baths of.

BATHS OF DI'OCLE'TIAN. See Diocletian, Baths of.

BATHS OF TI'TUS. See Titus, Baths of.

BATH (bȧth) **STONE.** A building-stone extensively used in England on account of its beauty, and obtained from quarries in the Lower Oölite of Wiltshire and Somersetshire. It is fine-grained, of a rich cream-color, and is composed of carbonate of lime, with a little carbonate of magnesia, but without silica. It is easily cut in the quarry, some beds working as readily as chalk, and it hardens on exposure to the air, but is not very durable. This stone was used for the restoration of Henry VII.'s Chapel in Westminster Abbey, and within twenty-five years it had begun to decompose. The name is derived from the town of Bath, in the vicinity of which the stone is largely quarried.

BATHURST, bȧth'ûrst. A city and county of New South Wales, Australia, the first settlement beyond the Blue Mountains (q.v.), which were long believed to be impassable (Map: New South Wales, E 3). In 1851 there were discoveries of gold here, which is mined, together with copper and silver. The country is bounded on the northeast by the Macquarie River, and on the southeast by the Lachlan. The whole district is admirably adapted to pastoral pursuits. It is well watered, and being 2000 feet above the level of the sea, has a moderate temperature. The population of the district in 1891 was 18,000. Bathurst is a fine city, with handsome public buildings and various important industries. It was created a municipality in 1862. It is the see of Anglican and Roman Catholic bishops. Population, in 1895, 9500.

BATHURST. A large island in the Arctic Ocean, intersected by the 100th meridian of west longitude, and situated immediately beyond the 75th parallel. Sherard Osborn here found the vertebræ of an ichthyosaurus—one of the few instances of organic remains discovered in the polar basin on the American side.

BATHURST. The principal settlement of the British Colony of the Gambia, West Africa, situated on a small island at the mouth of the Gambia, in about latitude 13° 28′ N. and longitude 16° 32′ W. There are Government houses, barracks, and a hospital. Facing the river are the stores of the European merchants. The exports consist of gum, wax, hides, rice, cotton, groundnuts, and rubber. Population, about 6000.

BATHURST. A port of entry and the seat of a United States consular agent on Nepisiguit Bay at the mouth of Nepisiguit River, in Gloucester County, New Brunswick, Canada, 175 miles north by east of Saint John. It has a good harbor and thriving fishing industries. Population, in 1901, 1867.

BATHURST, Allen, first Earl of Bathurst (1684-1775). An English statesman, born in London. He entered Parliament in 1705, and distinguished himself as a supporter of the union of England and Scotland. In 1711 Queen Anne made him a baron, and he won further distinction in the Upper House by impeaching the directors of the notorious South Sea scheme. Bathurst was a determined opponent of Walpole, and on that minister's resignation in 1742 was made a member of the Privy Council. In 1757 he became treasurer to the Prince of Wales, who, as George III., elevated him to an earldom in 1772. He was a generous patron of literature, and the friend of Congreve, Vanburgh, Swift, Prior, Rowe, Addison, Pope, Arbuthnot, Gay, and others. Pope dedicated his *Epistle on the Use of Riches* to Lord Bathurst, and complimented him in characteristic lines. His son Henry, second Earl Bathurst (1714-94), was Lord Chancellor of England 1771-78. Henry, third Earl Bathurst (1762-1834), son of the second earl, was English Colonial Secretary 1812-28.

BATHURST, Ralph (1620-1704). The uncle of the first Lord Bathurst, an English physician, prelate, and wit. He rose to eminence in medicine, and in the time of the Commonwealth was appointed physician to the State. After the Restoration he abandoned medicine, took holy orders, was chaplain to the King, and afterwards Dean of Wells. In 1664 he was made president of Trinity College, Oxford, and in 1691 was nominated to the See of Bristol, but declined the place. He was a master of ridicule, and made that his weapon to correct college delinquents. Some of his verses in the *Musæ Anglicanæ* are excellent of their kind. Consult Warton, *Life and Literary Remains of Bathurst* (London, 1761).

BATHURST IN′LET. An indentation of Coronation Gulf, in the Arctic Ocean, which projects 75 miles south into Canada, 300 miles northeast of Great Slave Lake (Map: Northwest Territories, H 1).

BATHURST IS′LAND. An island off North Australia, about latitude 12° S. and longitude 130° E., 2° due west of Port Essington, with Melville Island between. Its length and greatest breadth are 30 miles. The island is mountainous, and densely wooded, except at the west end.

BATHYÁNI, bŏt′yä-nē. See Batthyányi.

BATHYBIUS, bȧ-thĭb′ĭ-ŭs (Gk. *βαθύς*, *bathys*, deep + *βίος*, *bios*, life). The name given by Huxley, about 1868, to a supposed low form of life found at the bottom of some parts of the deep sea, consisting of formless ooze, or masses of slime without structure. It is no longer considered organic.

BATH′YCLES (Gk. *Βαθυκλῆς*). A Greek sculptor, born at Magnesia about B.C. 600. He has become celebrated through a colossal throne which he executed for the Spartans. This throne was decorated with reliefs which have been described by Pausanias. It was carved for the sanctuary of Apollo at Amyclæ, and inclosed the rude statue of the god.

BATIGNOLLES, bȧ′tē′nyŏl′. A former commune in the Department of the Seine, France, now a part of Paris, forming with Ternes the Seventeenth Arrondissement. It is the Parisian equivalent for the Whitechapel of London and the East Side district of New York.

BATISTE, bȧ-tēst′. A fine linen or cotton lawn originally made in France, and said to have been named from its inventor, one Jean Baptiste.

BATJAN, bȧt-yän′. or **BATSHIAN,** bȧt-shyän′. One of the Moluccas, lying west of Gilolo and east of Celebes. Batjan has a total area of 835 square miles, with a population estimated at 12,000 to 13,000, of which a few hundred are Chinese, Arabs, and Europeans, and the rest Malays or Alfores. The soil is fertile, and the main industry is the cultivation of spices, as on most of the Moluccas. It belongs to the Dutch, but is governed by a native sultan. There are several settlements, and on the western coast is situated Fort Barneveld.

BATLAPI, bȧt-lä′pē. A Bechuana tribe of the Bantu family, living between Taungs and Vryburg; formerly a powerful tribe, now weakened by wars with the Boers and Matabeles. Though still the most numerous of the Bechuana group, they are under British control.

BAT′LEY. A town in the West Riding of Yorkshire, England, 8 miles southwest of Leeds, and about one mile from Dewsbury, with which it unites in sending one member to Parliament (Map: England, E 3). The town was incorporated in 1868, has owned its water-supply since that year, and its gas-works since 1873. It also maintains public baths, markets, and a cemetery. There is an ancient grammar school, and a technical school supported by public subscription, with a municipal appropriation. Batley is the centre of the heavy woolen trade, and manufactures army cloth, shoddy, drugget, etc. Population, in 1891, 28,800; in 1901, 30,300.

BATMAN. See Bat.

BATNA, bät′nȧ. The chief town of an arrondissement, Department of Constantine, Algeria, 62 miles south-southwest of Constantine. It is situated at the foot of Mount Tugurt, which is covered with fine cedar wood. The town is an important military post and trading station between the Sahara and Tell. Population, in 1896, 8381.

BATN-EL-HAJAR, bät′′n-ĕl-hä′jär (Ar., womb of rocks). A stony district of Nubia, along the Nile, in latitude 21° N., where the river forms its second cataract.

BAT′ON (Fr. *bâton*, OF. *baston*, stick). The name of a short staff presented to a field-marshal in foreign armies as a symbol of his newly bestowed authority. It is also the name of the long staff carried by the drum-major of an infantry regiment, of a policeman's stick or club, and of the rod wielded by the conductor of an orchestra.

BATON, or **BEND SIN′ISTER.** In heraldry, an armorial charge denoting bastardy, commonly but erroneously designated as bastard bar or bar sinister. The charge consists of a bendlet sinister *couped*—cut off, that is, at each end so as not to touch the extremities of the shield. When used as a mark of illegitimacy the baton is placed over the paternal coat of the bastard. According to early custom, the baton could be neither destroyed nor changed without the consent of the head of the family or of the King; but it was customary for the sovereign to reward distinguished merit by permitting the alteration of the bend sinister to bend dexter. In more recent times it has been the practice to substitute the gobbonated bordure for the baton, especially in the case of the legitimate issue of bastards.

BATONI, bȧ-tō′nē, or **BATTONI**, Pompeo Girolamo (1708-1787). An Italian painter, born at Lucca. He sought to counteract the mannerism prevalent in his day by reviving the style of Raphael and the earlier classicists. He was the greatest painter of Italy during the middle of the Eighteenth Century, and completed in all about 40 notable works, which are scattered throughout the principal art galleries of Europe. Among the most important of these are: Portraits of the Popes Benedict XIV., Clement XIII., and Pius VI., and of the Emperors Joseph II. and Leopold II.; "Marriage of Saint Catharine" (Quirinal, Rome); "Achilles" (Uffizi, Florence); "Choice of Hercules" (Turin Gallery); "Madonna" (Louvre, Paris); "Magdalen," "John the Baptist," and "The Fine Arts" (Dresden Gallery); "Marriage of Cupid and Psyche" (Berlin Museum). His "Magdalen" is universally considered his masterpiece.

BATON ROUGE, băt′on rōōzh (Fr., red baton or stick). The capital of Louisiana, 89 miles by rail northwest of New Orleans, on the eastern bank of the Mississippi, and on the Yazoo and Mississippi Valley and the Texas and Pacific railroads (Map: Louisiana, D 3). It is a picturesque city, built on the river bluff, and many of its houses are quaint and old, of French and Spanish styles. Baton Rouge is the seat of the State University, organized in 1860, and contains State educational institutions for the deaf and dumb and blind, orphan asylums, State penitentiary, and State Agricultural Experiment Station. Other features of interest are: The State Capitol, the courthouse, city hall, post-office, high-school building, and a national cemetery. There are extensive manufacturing interests, including lumber, cottonseed products, brick, sugar, and artificial ice. The city is governed, under a charter of 1898, by a mayor, elected every four years, and a city council, which has power of election in departments of police, improvements, finance, and judiciary. Baton Rouge was one of the earliest French settlements in Louisiana. At the beginning of the Revolution it was strongly garrisoned by the English, but in September, 1779, was taken by a large Spanish force under Governor Galvez. Baton Rouge became the capital of the State in 1849, and on January 26, 1861, the Louisiana ordinance of secession was adopted here. On August 5, 1862, a Union force, under Gen. Thomas Williams, was fiercely attacked here by a strong Confederate force under Gen. John C. Breckenridge, the latter being repulsed after two hours of severe fighting, though General Williams lost his life. Population, in 1890, 10,478; in 1900, 11,269.

BATRACHIA, bȧ-trā′ki-ȧ (Gk. *βάτραχος*, *batrachos*, frog). A word synonymous with Amphibia (q.v.).

BAT′RACHOMY′OMA′CHIA (Gk. *βατραχομυομαχία*, 'The Battle of the Frogs and the Mice,' from *βάτραχος*, *batrachos*, frog + *μῦs*, *mys*, mouse + *μάχη*, *machē*, battle). A Greek mock-heroic poem, erroneously bearing the name of Homer. The ancients said that its actual author was Pigres of Caria, brother of Queen Artemisia, who joined Xerxes in his invasion of Greece. The poem is a parody on the *Iliad*, in which the military preparations and contests of beasts, single combats, intervention of the gods, and other Homeric circumstances are described with much humor. Chief critical edition by Ludwich (Leipzig, 1896).

BATSHIAN, bȧt-shyän′. See Batjan.

BAT′TA (from Canarese *bhatta*, rice in the husk). An allowance in addition to the ordinary pay of officers of the British Army in India. See Pay and Allowances, Military.

BATTAKS, bät′tȧks, or **BATTAS**, bät′tȧz. The natives of the northern interior of Sumatra. Physically they are somewhat darker, taller, and stronger than the coast Malays, and are mesocephalic in head-form. One of the most individual of East Indian peoples, they present marked contrasts of culture and seeming savagery. A well-developed village life, agriculture (even including a plow), cattle-breeding of a notable sort, metal-working (even gold-weaving), and the arts of reading and writing, with an alphabet modified from the characters of the Asoka inscriptions, flourish on the one hand; while on the other there exist debt-slavery, permissive polygamy, exocannibalism, and man-eating as a punitory institution, together with primitive ancestor and spirit worship, influenced, as the mythological names, etc., indicate, by Hindu sources. The Battaks proved remarkably unresponsive to the world of Islam, with which they have for centuries been in more or less close contact. The house-architecture of the Battaks, solider than the general Malay type, is a modification of the pile-dwelling of a shore people, to suit the highlands, while in parts of the area the primitive tree-house still survives. Their palisaded kampongs (villages) and other war devices are of interest. A collection of 60 views of houses, landscapes, natives, etc., from the Battak country was published in 1880 by the Penang Photographic Studio. Since the account of the Battaks by Junghuhn in 1847, there have been several studies of this interesting Malay people, the chief of which are: Schreiber, *Die Battaländer in ihrem Verhältniss zu den Malaien auf Sumatra* (Barmen, 1847); and Brenner, *Besuch bei den Kannibalen Sumatras* (Würzburg, 1893).

BATTAL′ION (Fr. *bataillon*: for derivation, see Battle). Infantry. A separate body of men with a distinct organization, and generally the unit of command in the organization or manœuvring of an army. Originally the battalion was supposed to comprise the largest number of men, who, when drawn up in battle order, could hear the word of command or trumpet-call. The modern battle formation, and consequent army organization, is a direct result of the improved firearms with which modern infantry is equipped, the principle now underlying the strength of the battalion as a unit of command being generally the largest number of men capable of effective control as a unit in action. Modern expert military opinion, based on the experience of recent wars, would seem to indicate the necessity of still further reducing the strength of the unit of command in 'attack' formation, a single company, when extended for 'attack,' covering over half a mile of ground. This, together with the fact that the present complement of officers is not enough to insure complete control, is a difficulty which increases with the battalion, and correspondingly with the strength of the battalion. It also is reflected in the difficulty of obtaining a rapid ammunition supply along the firing-line, and renders more arduous the task of the hospital corps and stretcher-bearers. The reader is referred to the infantry drill regulations of the various armies, and also to such reports as have been made public of the foreign military attachés serving with the belligerents in Cuba (1898) and South Africa (1899-1902).

In the United States Regular Army there are three battalions to a regiment, each, when possible, commanded by a major. The following instances show the battalion strength in the armies of the greater European Powers:

England.—Battalion consists of 8 or 10 companies, corresponding in strength to the United States regiment.

France.—Battalion consists of 4 companies; 3 battalions to a regiment.

Germany.—Battalion consists of 544 men, raised in war to 1002, and divided into 4 companies. There are 3 battalions in a regiment.

Russia.—The battalion consists of 4 companies; the regiment of 4 battalions, or 17 companies in all.

Italy.—Four companies to a battalion; 3 battalions to a regiment.

The name battalion is also given to engineers and various departmental corps, consisting of two or more companies. See Army Organization, and Tactics, Military; also Infantry.

BAT'TELS (perhaps allied to *battel*, fertile, fruitful, *batten*, fatten, nourish lavishly). A term in use at Oxford University to denote provisions obtained from the buttery and kitchen, hence the accounts for board and provisions, and so coming to be applied finally to the whole of college accounts for board, lodging, tuition, and incidentals. One who stands indebted on the college books for such provisions is said to 'battel,' which has come to be equivalent to residing at the university; hence a battler usually means a student in residence, though formerly applied to any student of a rank below that of a commoner. At Eton, battels are small food allowances in addition to that supplied by the college.

BAT'TEN (by form of *baton*, Fr. *bâton*, stick). The name given in commerce to a squared timber, 6 feet or more—usually 12 feet or 14 feet—long, 7 inches broad, and 2½ inches thick, used for various purposes in carpentry and building. The name is also given to strips of wood of any size nailed across boards to hold them together, to cover the cracks or joints of boarding, to support the laths for a plastered wall, to fasten down tarpaulin or roof-coverings, etc. In ship-building, battens are long slips of timber used for setting fair the sheer lines of a ship, for staying the lower masts, and for laying off distances. The name is also applied to wooden strips fastened to masts, yards, or rigging to protect them from chafing.

BATTENBERG, bät'ten-berk (anciently, *Mons priscus Batavæ gentis*, 'ancient hill of the Batavian tribe'). A town of Prussia in Hesse-Nassau, on the Eder, 15 miles north-northwest of Marburg (Map: Prussia, C 3). Before 1866 it belonged to Hesse-Cassel. The title of Prince of Battenberg dates from 1858, when it was conferred on the issue of a morganatic marriage of Prince Alexander of Hesse with the Countess von Hauke. Their second son, Prince Alexander, was called to occupy the throne of Bulgaria. (See Alexander I.) Population, in 1900, 950.

BATTENBERG, Henry Maurice, Prince of (1858-96). Son of Prince Alexander of Hesse by a morganatic marriage with the Countess von Hauke. In 1885 he married Princess Beatrice, youngest daughter of Queen Victoria. He was made Governor of the Isle of Wight, took part in the Ashanti Expedition in 1895, and died of fever on his way home.

BAT'TENHALL, Jesse Park (1851-91). An American chemist, born in Troy, N. Y. He studied chemistry at the School of Mines, Columbia College, New York, also under Wöhler, Kolbe, and Fittig, in Germany, and under Marignac, in Switzerland. In 1879 he was appointed analytical chemist to the United States Laboratory in New York. His publications include a translation of Naquet's *Legal Chemistry* (New York, 1876); a work on *Adulteration of Food and Drink* (New York, 1886); and several scientific papers.

BAT'TERING-RAM' (Engl. *batter*, Fr. *battre*, to strike). An engine of war used in ancient times, and in the Middle Ages. It consisted of a beam of wood, with a mass of bronze or iron on one end, resembling the head of a *ram* (in Lat. *aries*). In its simplest form, it was borne and impelled by the hands of the soldiers; afterwards it was suspended in a frame, and made to swing. Another form moved on rollers. The alternating motion was communicated by ropes. To protect those working it, a wooden roof (*testudo*) was constructed over it, and the whole was mounted on wheels. The beam of the ram varied from 60 to 120 feet in length, the head sometimes weighed above a ton, and as many as 100 men were at times employed in impelling the machine. When the blows were long enough continued, hardly any wall could resist. When or where it was invented is unknown. It is mentioned by Ezekiel. The Romans received it from the Greeks.

BAT'TERSEA (Saint Peter's Isle, from AS. *éj*, island). A metropolitan borough of Greater London (Map: London and Vicinity, E 6).

BAT'TERSEA PARK. A park of 185 acres in the southwestern part of London, on the Thames, laid out in 1852-58. It contains a subtropical garden of four acres, in which tropical plants are displayed; artificial lakes, and other attractions.

BAT'TERSON, Hermon Griswold (1827-1903). An American Episcopalian clergyman. He was born at Marbledale, Litchfield County, Conn., and was educated privately. In 1860 he was ordained to the ministry. He was pastor of Saint Mark's Church, at San Antonio, Tex., rector of Grace Church, Wabasha, Minn., of Saint Clement's and of the Church of the Annunciation, Philadelphia, and of the Church of the Redeemer, New York. He was the author of several works, all of which have been frequently reprinted, such as the following: *The Missionary Tune-Book* (1868); *Christmas Carols and Other Verses* (1877); *Sketch-Book of the American Episcopate* (1876); *Pathway of Faith; Vesper Bells.*

BAT'TERY (Fr. *batterie*, from *battre*, Lat. *batuere*, to batter, beat). A term pertaining to the artillery arm of the military service. A number of guns or heavy ordnance mounted for the defense of a fortified place would receive the collective title of *Fortress Battery.* Groups of guns used in an attack on a fortified place, which is being besieged, become *Siege Batteries.* *Light,* or *Field Batteries,* consist of four or more guns, with full equipment of men, horses, carriages, caissons, etc., designed and organized for service with troops in the field. *Horse Artillery Batteries* are the most mobile of all, and act with the cavalry. They differ from the field-artillery in that the gunners are mounted, instead of being seated on the carriages. *Mountain, Mule, Bullock,* or *Elephant Batteries* consist of guns so constructed that they may be taken apart and transported on the backs of animals. (See MOUNTAIN ARTILLERY.) Batteries usually are designated according to the purpose for which they are employed, as: *Barbette Battery,* guns that are fired over a parapet, or mounted *en barbette.* *Blinded Battery,* one protected by armored or bomb-proof defenses. *Breaching Battery,* one designed to make a breach in the enemy's defenses. *Cavalier Battery,* situated within the bastion (q.v.). *Counter Battery,* one designed to disable such guns of the defense as interfere with the breaching batteries. *Enfilading* (q.v.) *Batteries.* *Floating Battery.* *Masked* or *Fascine Battery,* one concealed by fascines or other artificial device. *Mortar Battery,* one consisting of mortars (q.v.). *Redan* (q.v.) *Battery.* *Sunken Battery.* *Water Battery,* one close to, and but slightly above, high-water mark.

Battery, in a naval sense, is used to denote all the guns of a ship: all the guns on one side, as the *starboard battery,* the *port battery;* a certain part of a ship's guns, as the *gun-deck battery,* the *rapid-fire battery,* the *six-inch battery,* etc.

When a battery of artillery in the field comes under rifle-fire, its effectiveness is liable to cease at any moment, should the riflemen be under protected cover. In action, the artillerymen serving a field-battery have, of necessity, to secure an open field, and a more or less commanding point from which to lay their guns. This entails exposure, and consequently dictates the distance or proximity to the enemy to which a battery may venture. No other arm is so dependent as artillery on its own mobility, not only for offensive purposes, but largely for its own safety. Before the introduction of the long-range rifle, there were but few instances where guns, in order to take up effective positions, were forced to come under accurately sighted rifle-fire. Now that it is compelled to face that risk, great rapidity of fire as well as movement becomes a prime necessity. The shifting of fighting value from the individual man to the firearm with which he is armed has thrown the balance of power on the artillery—a responsibility which will only be increased with succeeding improvements and inventions. In the battles of the future the better trained, better equipped, better handled, more mobile artillery—granting that the men on both sides are equal in stamina—will be able to drive back the attack, and so save the situation, or force in the defense, and win the whole battle. See ARTILLERY; COAST ARTILLERY; FIELD ARTILLERY; CANNON; SIEGE GUNS; ARMOR PLATE; FORTIFICATION; SHIPS, ARMORED; and TACTICS, MILITARY.

BATTERY. See ASSAULT AND BATTERY.

BATTERY (in electricity). See VOLTAIC CELL; GALVANIC BATTERY; ELECTRICITY.

BATTERY, THE. A tract of 21 acres forming the southern point of the city of New York, the site of fortifications erected by the Dutch, and later a public park. In the early history of the city the north side of the Battery was lined with the most aristocratic residences. The view of the rivers and bay from the Battery wall is unsurpassed, and the park is still a much frequented pleasure-ground, though much disfigured by the elevated railroads which cross it. The park contains the Barge Office and Castle Garden, now the Aquarium.

BATTEUX, bȧ'tē', CHARLES (1713-80). A French philosopher and writer on æsthetics. He was born at Alland'huy, near Vouziers (Ardennes), and studied theology at Rheims. Upon his ordination as priest he went to Paris, where he became professor of Greek and Latin philosophy at the Collège de France. His works, chiefly on æsthetics, enunciate the principle that art is not an imitation of nature as such, but of the element of the beautiful in nature, the faithful imitation or interpretation of which is regulated by the innate sense of taste. This theory, which has had many followers and which was afterwards enunciated by Sulzer in Germany (*Theorie der schönen Künste*), may be traced in the principal work of the author, *Cours de belles-lettres* (5 vols., 1765), a later edition of which appeared under the title of *Principes abrégés de la littérature* (6 vols., 1824). This work is an amplification of an earlier production entitled, *Les beaux-arts réduits à un même principe.*

BATTHYÁNYI, bŏt'yä-nyē. A celebrated Hungarian family. It traces its origin back to a companion of Arpád, the Magyar invader of Hungary (about 894). It has given to Hungary many warriors and statesmen. The surname is derived from lands obtained in the Fourteenth Century. FRANCIS BATTHYÁNYI (died 1566) distinguished himself at the battle of Mohács, 1526. BALTHAZAR BATTHYÁNYI, who was the head of the family in the latter half of the Sixteenth Century, fought with distinction in the Turkish wars. Prince CHARLES BATTHYÁNYI, a lieutenant field-marshal of the Empire, distinguished himself in the Austrian War of Succession, particularly by a victory over the French and Bavarians at Pfaffenhofen, on April 15, 1745. Count CASIMIR BATTHYÁNYI, a member of the principal branch of the family, was born June 4, 1807. He was Minister of Foreign Affairs in Hungary during the Revolution of 1848-49, in which he also distinguished himself as a military governor. After the triumph of the Austrians, he fled with Kossuth into Turkish territory, where he remained until 1851. He then went to France, and died in Paris, July 13, 1854. Count LOUIS BATTHYÁNYI, belonging to another branch of the same family, and born at Presburg in 1809, espoused the national cause, yet sought to maintain the connection with Austria and his allegiance to the Austrian sovereign. He was appointed president of the Ministry when Hungary obtained a ministry of its own, in March, 1848. When the breach between Hungary and the Hapsburgs widened into open war, he resigned, and afterwards took part in public affairs, chiefly as a member of the Diet. After the Austrians entered

Pesth he was arrested, in January, 1849, and on October 6 was executed. Consult Horváth, *Graf Ludwig Batthyányi* (Hamburg, 1850).

BATTI'ADÆ (Gk. Βαττιάδαι, *Battiadai*, descendants of Battus). Kings of Cyrene for eight generations. (1) Battus I., founder and first King of the Greek colony of Cyrene in Libya. He came from the Island of Thera, and was directed to the site of Cyrene by the Delphic oracle. The generally accepted date—not historically certain—of the settlement is about B.C. 630. Battus I. ruled 40 years, according to Herodotus. (2) Arcesilaus I., son of Battus I., and second King of Cyrene. According to Herodotus, he ruled 16 years. (3) Battus II. (called *The Blessed*, or *The Wealthy*, ὁ εὐδαίμων), son of Arcesilaus I., and third King of Cyrene. In his reign immigrants were invited from Peloponnesus, Crete, and elsewhere, under the promise of a new division of lands. These lands were taken from the Libyans, who turned for aid to the Egyptian King, Apries. A battle was fought in B.C. 570 at Irasa, in which the Cyrenians were victorious. Cyrene now increased greatly in power and importance. (4) Arcesilaus II. (called 'the Oppressive,' ὁ χαλεπός), son of Battus II., whom he succeeded on the throne. He began to rule, according to Herodotus, about B.C. 560. Dissensions arose between him and his brothers, in consequence of which the latter withdrew from Cyrene and founded Barca. He met with a severe defeat at the hands of the Libyans, and was finally murdered by his brother Haliarchus, or Learchus. His murder was afterwards avenged by his wife, Eryxo. (5) Battus III. (called 'the Lame,' ὁ χωλός), son and successor of the preceding. In his reign the Cyrenians, despairing of the condition of the State, invited, by advice of the Delphic oracle, Demonax of Mantinea to their city to govern their affairs. At this time the powers and privileges of the King were greatly curtailed. (6) Arcesilaus III., son and successor of Battus III. Attempting to overthrow the power of Demonax, he was unsuccessful and fled to Samos. He there, with the help of Polycrates, collected a large army, and, returning to Cyrene, wreaked terrible vengeance on his enemies. After Cambyses had subjugated Egypt, he submitted to the Persian King. Afterwards he withdrew to Barca, and was there slain by the King, Alazir. His death was avenged by his mother. (7) Battus IV., son of the preceding, and seventh King of Cyrene. (8) Arcesilaus IV., son and successor of Battus IV., was the last King of Cyrene. He won a chariot race at the Pythian Games in B.C. 462, and is celebrated therefor in Pindar's fourth and fifth Pythian odes. He is also said to have won a victory at the Olympic Games in B.C. 460. Shortly after this a revolution broke out at Cyrene, and he fled to Euhesperides and was there slain.

BATTLE (Fr. *bataille*, from Lat. *batuere*, to beat, strike). An engagement or combat between opposing military bodies. All strategic operations in war must culminate in the *battle*, for that alone can give them significance. Whether a commander will attack or fight a defensive battle depends on the previous strategical and tactical operations, on the general plans of the commander-in-chief, and on the condition and the particular situation in which his army finds itself at the time it meets the adversary. The tactical offensive is usually preferred as promising more decisive results; but the tactical defensive is often forced on an army. When the hostile armies meet, the commander of the column in question is properly with the advance-guard (q.v.). The leading battalion forms line of company, columns of sections, and advances with a light skirmish line in front; the engineers and bridge train halt, and the battery of the advance-guard takes up a preparatory position. The army commander only learns of the situation after a considerable interval, and by that time other events have probably transpired; moreover, he knows nothing of the enemy's strength, plans, or degree of preparedness or deployment. So that in opening battle it is not the information regarding the enemy that decides, but rather the force of circumstances. An energetic commander always strives to gain the *initiative*, and for this end the putting in action of the artillery is of great effect. As soon as the artillery enters the field, events move rapidly toward the crisis, and the battle will probably always reach this point before the army commander's orders begin to have effect. In small commands the commander can use his reserves to bring about decisive action, but in the larger battles the forces must be properly grouped in the strategic advance to effect this, and the commander-in-chief can only assist the subordinate commanders by sending in new troops at decisive points. The infantry first occupies all points outside of the enemy's fire that are calculated to give support to the infantry advance, and the ground to be passed over is carefully reconnoitred.

Superiority over the enemy can be attained only by being able to fire with greater precision, effect, and rapidity, and this can be accomplished only by surrounding him on one or both flanks. Usually the flank attack can be arranged only after contact with the enemy. It may be directed against the outer flanks of the enemy or against the flanks of portions of his line. Reserves are obtained by taking troops away from points where decisive action is not desired. In case of fortified field positions, the effort is first made to secure some commanding position, and, by effective artillery fire, force the enemy out of them; but if this fails, the same principles of attack apply as before, except that greater care is taken to perfect all preparatory measures, and often the measures resolve themselves into those employed against permanent land forts. An effective pursuit can be attained only when there is sufficient daylight left after the victory, when it can be directed against a flank, and when comparatively fresh troops are available. But these conditions are rarely found. Nevertheless, pursuit is essential. The cavalry and horse-artillery are particularly useful for this purpose, turning the enemy's flanks, firing with the artillery on his masses in defiles, and keeping up with him even in the night. Pursuit is limited only by the condition of the pursuers, and the distance they may travel from their base of supplies.

A *defensive* battle may be purely defensive, or (the usual case) it may be only temporarily defensive, its object being to gain time. The first consideration is a good position, and this must be carefully intrenched, provided there is time; but all intrenchments should be entirely hidden from the enemy. This position is not occupied at the beginning, but the troops are first assembled in a preparatory position. The positions available for the artillery usually decide the grouping of the forces, except in covered country, when the infantry line has the preference, and the artillery finds positions in rear. As the battle advances it takes more and more the character of a truly offensive action. Retreats are difficult, even when voluntary. When night intervenes after the battle, a considerable distance may be placed between the two forces and the units somewhat reorganized. The artillery usually furnishes the first support against pursuit, and it is protected by the cavalry, and this leads gradually to the formation of a rearguard.

Reference should be made to the article TACTICS, MILITARY, where will be found an account of the strategy and tactics used in active military operations, including a complete bibliography. That article also discusses the tactics peculiar to the various arms. See ARMY ORGANIZATION; ADVANCE-GUARD; ATTACK; RECONNAISSANCE; COAST DEFENSE; FORTIFICATION; OUTPOST, etc.

BATTLE, TRIAL BY, OR WAGER OF. The determination of a controversy by a physical combat, conducted in the presence of judges and according to fixed judicial rules. Although "it prevails among all the races from which Britain derived its Teutonic blood," it was not a legal institution of Anglo-Saxon England, but was introduced into Britain by William the Conqueror. Sir James Fitzjames Stephen has expressed the opinion that "trial by battle was only private war under regulations." This view is rejected by Pollock and Maitland, however, as well as by other writers, who consider it a social process for the discovery of the truth. "What triumphed was not brute force, but the truth. The combatant who was worsted was a convicted perjurer." Such was the theory underlying this form of trial.

It was employed both in criminal and civil controversies, but by Bracton's time it was limited to appeals of felony in criminal cases, and to the writ of right in civil cases. In the former, the combat was between the prosecutor of the felony and the alleged felon, unless one or the other was of unfit age or sex, where his or her place might be taken by a champion. In the civil proceeding by writ of right (the final remedy by a claimant of real property who could not rely on recent possession), either party could appear by champion. This led to the use of professional pugilists, and to the business of training and keeping such champions for hire. By the time of Edward I., any defendant to whom trial by battle was offered could decline and demand a trial by jury. On the other hand, the defendant, at least in an appeal of felony, retained the legal right to compel his prosecutor to do battle, until 1819, when the statute of 59 George III., c. 46, enacted that "all appeals of treason, murder, felony, or other offenses shall cease," and that there should be no wager of battle either in criminal or civil controversies. Attempts had been made during the reigns of James I. and Charles I. to abolish trial by battle, but without success, and its abolition in 1819 was due to the decision of the Court of King's Bench, in Ashford *v.* Thornton (reported in 1 Barnewall and Alderson, 405) that the defendant in an appeal of felony, who had demanded trial by battle, was entitled to it as "his lawful mode of trial." In Scotland this mode of trial came to an end late in the Sixteenth Century, and throughout Britain it was practically obsolete from that time. Consult: Stephen, *History of the Criminal Law of England* (London, 1883); Pollock and Maitland, *History of English Law* (2d ed. Boston, 1899); Neilson, *Trial by Combat* (London, 1890).

BAT'TLE. A market-town of Sussex, England, 7 miles northwest of Hastings (Map: England, G 6). Population, 3000. Its name and title to distinction arise from the celebrated Battle Abbey, founded by William the Conqueror to commemorate his victory over Harold, the English King, in 1066. Although generally called the Battle of Hastings (q.v.), the conflict took place on Senlac Hill (now Battle Hill), and the abbey marks the spot where Harold fell. At the Reformation, the abbey was converted into a private residential mansion; it is open to visitors once a week. The "Roll of Battle Abbey" contained a list of the Norman nobles in the suite of the Conqueror. It was formerly deposited in the abbey, and was destroyed in the burning of Cowdray House in 1793. Ten copies exist, but the 'roll' is considered to have been of apocryphal origin. Consult: Walcott, *History of Battle Abbey* (London, 1867); Hawthorne, *English Note-Books* (Boston, 1870); Duchess of Cleveland, *The Roll of Battle Abbey* (London, 1889).

BATTLE ABOVE THE CLOUDS, THE. In United States history, the name applied to that part of the battle of Chattanooga which resulted in the capture of Lookout Mountain by General Hooker, November 24, 1863. See CHATTANOOGA, BATTLE OF.

BAT'TLE-AXE'. A weapon used in warfare from the most remote antiquity to the present day. Battle-axes of stone or bronze preceded those made of iron or steel. Many different forms of the battle-axe, varying in size, weight, and length of handle, have been, and still are, used. The francisca battle-axe, used by the Franks, often served as a missile. The pole-axe is a battle-axe with a long handle.

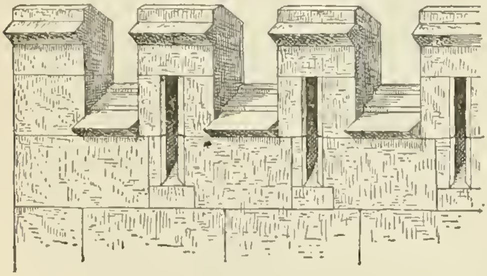
BAT'TLE CREEK. A city in Calhoun County, Mich., 121 miles west of Detroit; at the confluence of the Kalamazoo River with Battle Creek, and on the Michigan Central, the Chicago and Grand Trunk, and the Cincinnati Northern railroads (Map: Michigan, H 6). It contains a public-school library (16,500 vols.), which occupies a fine building, and, among other prominent structures, the central school building, the Sanitarium, Y. M. C. A. Building, Post Tavern, Post Building (office), and Post Theatre. There are four parks, one of which is at Goguac Lake, a popular summer resort 1½ miles distant. The city is the headquarters of the Seventh-Day Adventist denomination, which maintains a widely known sanitarium, with a hospital and dormitory, homes for children and the aged, Battle Creek College, and a publishing house, the output of which is extensive. The tabernacle of this denomination has an auditorium with a seating capacity of 3500, one of the largest ecclesiastical halls in the State. Battle Creek is the centre of a fertile agricultural district, and controls a considerable trade in the products of the region, principally grain, fruit, live stock, and wool, as well as in its most important manufactured products: threshing-machines and agricultural implements, pumps, engines, flour, and hose fixtures. The city enjoys a national reputation for its breakfast and health foods. The repair-shops of the Chicago and Grand Trunk Railroad are located here. Manufacturing interests are promoted by excellent water-power. Settled about 1835, Battle Creek was incorporated as a village in 1850, and nine years later received a city charter. The government, under a revised charter of 1900, is vested in a mayor, annually elected; a city council; and administrative officials, of whom the police commission, city attorney, city engineer, and health officer are appointed by the mayor, the last three with the consent of the council. The others are chosen by popular vote. The water-works are owned and operated by the municipality. Population, in 1890, 13,197; in 1900, 18,563.

BAT′TLE-CRY OF FREE′DOM, THE. A patriotic song of the Civil War, by George Frederick Root (1861).

BAT′TLEFORD. A trading town in the Saskatchewan District, Northwest Territories, Canada, at the junction of the Saskatchewan and Battle rivers, 70 miles north of the line of the Canadian Pacific Railroad (Map: Northwest Territories, H 4). From 1876 to 1883 it was the capital of the Northwest Territory, an honor that now belongs to Regina (q.v.). The insurrection headed by Louis Riel (q.v.) originated near Battleford. The country about the town is a fertile farming region. Population, in 1891, 1500; in 1901, 797.

BAT′TLE-HYMN OF THE REPUB′LIC, THE. A stirring song by Julia Ward Howe (1862), published in the *Atlantic Monthly*. The music is that of the song, "John Brown's Body."

BAT′TLEMENT (evidently from unrecorded OF. **bastillement*, from OF. *bastiller*, to fortify, *bastir*, Fr. *bâtir*, to build; cf. *bastille*, fortress). A term describing the parapet of mediæval defensive towers and walls. The parapet is formed by a number of rising parts known as *cops* or *merlons*, the intervening spaces called *crevelles*. The soldier would take shelter behind the *merlon*, while he fired through the *crevelle*. Good examples are found on the towers of old castles throughout Europe; and on churches, armories, and other public buildings in the United States, where they are employed for their architectural value.



BATTLEMENT.

BATTLE MON′UMENT. (1) An abbey erected on the site of the battle of Hastings by William the Conqueror. The remains of it exist to this day. (2) A monument, 72 feet high, erected in 1815, at Baltimore, Md., in memory of those who defended the city against the British in September, 1814.

BATTLE OF ALCAZAR, äl-kä′thär, THE. The title of a drama by Peele (1594). It contains the notable character of Muley Mulocco, and is founded on an actual fight which took place between the forces of the kings of Portugal and Morocco, in 1578. Copies of the first edition exist in the British Museum and elsewhere in English public libraries.

BATTLE OF HAST′INGS, THE. A battle fought between Harold of England and William, Duke of Normandy, October 14, 1066, in which the former lost his life and more than 30,000 men. Two poems by Chatterton, appearing about 1768, and a drama by Cumberland, performed in 1778, are founded on the event. See WILLIAM I.

BATTLE OF IS′SUS, THE. A battle fought B.C. 333, in which Alexander defeated Darius, with a loss of 100,000 men. The Persian Queen and her family were captured. The Macedonian loss was estimated to be only 300 foot and 100 horse. The battle was made the subject of a famous mosaic, which was once in the House of the Faun at Pompeii, and is now preserved at the Museo Nazionale, Naples.

BATTLE OF PRAGUE, präg, THE. A battle fought at Prague, May 6, 1757, in which the Austrians were defeated by Prince Henry of Prussia, their whole camp equipage taken, and their commander, General Brown, mortally wounded. An example of programme music describing the battle was composed by Kotzwara, and published posthumously in 1792. It was written for pianoforte, with violoncello and drum. Mention of it is made in the early part of Thackeray's *Yellowplush Papers*, as the favorite musical exercise of rather vulgar young women.

BATTLE OF THE BAL′TIC. A great naval battle fought April 2, 1801. The English fleet, under Lord Nelson and Admiral Parker, bombarded Copenhagen, and took and destroyed 28 ships of the Danish fleet. The poet Thomas Campbell commemorated it in a stirring lyric of the same name, published in 1809.

BATTLE OF THE BOOKS. The title of a famous book by Jonathan Swift, which grew out of the controversy over the comparative merits of ancient and modern literature. The controversy was started in France by Charles Perrault. In 1687 he read before the Academy a poem called *Le Siècle de Louis le Grand*, in which he aroused the classicists by placing the moderns above the ancients. He was assailed by Boileau in *Réflexions sur Longin* (1693), and in other works. Perrault subsequently elaborated his position in the *Parallèle des anciens et des modernes* (1688-96). The dispute was taken up by English scholars. Sir William Temple sided with the ancients, and was aided by Charles Boyle, fourth Earl of Orrery. Temple was overwhelmed by Richard Bentley and William Wotton. Swift burlesqued the whole controversy by giving a "full and true account of the battle fought last Friday between the ancient and modern books in Saint James's Library," of which Bentley was librarian. See the sketches in this Encyclopædia of the authors here mentioned.

BATTLE OF THE FROGS AND MICE. See BATRACHOMYOMACHIA.

BATTLE OF THE KEGS. See HOPKINSON, FRANCIS.

BATTLE OF THE SPURS (named so from the many gilt spurs gathered by the victors). The name given to a battle at Guinegate, August 16, 1513, in which Henry VIII., of England, and the Emperor Maximilian routed the French cavalry.

BATTONI, bȧt-tō′nē. See BATONI, POMPEO.

BATTONYA, bŏt′tô-nyŏ. A market-town of the County of Csanád, Hungary, about 60 miles east of Szegedin. Its principal industries are connected with the production of tobacco and wine, and the cattle-raising of the district (Map: Hungary, G 3). Population, in 1890, 12,000.

BATTUE, băt′tü (Fr., from *battre*, to beat, strike). The method adopted in many parts of the world for driving wild animals to a point where the huntsman is secreted ready to kill them. Specifically, battue means to-day the spreading of beaters over the moors of Scotland, Ireland, and the north of England in a wide circle and gathering them to a narrower one, whereby the grouse are driven past groups of gunners, and shot at from cover. Similar tactics are employed with partridge, particularly in the open lands of the east of England; and the woods and coppices in England are beaten to drive the pheasants out of the timber and undergrowth and over the guns stationed on the adjacent pastures. In earlier times it was called 'driving' and was, and is, used extensively in Germany for driving the deer. And so it was in England and in France when deer abounded there. Hundreds of old prints and rare engravings and paintings attest the existence through centuries of this method of killing game. In Russia it is called the 'surround,' and is still put in practice in bear-hunting, the whole community being hired to surround a located bear and prevent his escaping the man with the gun. In India modifications of this method are used in tiger-hunting, and in driving elephants into inclosures from which they cannot escape. In Patagonia the natives surround the guanacos in the same way. Indeed, as contradistinguished from still-hunting and stalking, the battue, under various names, has been used in every country and time.

BAT′TUS. See BATTIADÆ.

BATU KHAN, bȧ-tōō′ kän (? -c.1255). The leader of the Mongols in their invasion of Europe in the Thirteenth Century, grandson of Genghis Khan and nephew of Ogotai Khan. Given command in 1235 of the Mongol Army destined against Europe, he marched westward, crossed the Volga River, and dividing his forces sent one southward to bring the Bulgarians to submission, while with the main army he advanced into the heart of Russia. On December 21, 1237, he assaulted and took the city of Riazan. After this he captured Moscow, Vladimir, and, in 1240, Kiev, his followers everywhere perpetrating horrible atrocities. "The villages disappeared, and the heads of the Russians fell like grass before the sickle." The Russian princes were forced to bow to the Mongol yoke. In 1241 Batu Khan advanced into Hungary and overwhelmed the army of Béla IV. At the same time another Mongol army advanced against the Poles. On the memorable field of the Wahlstatt, near Liegnitz, the forces of the Silesian duke and the Teutonic knights succumbed to the Mongols, who, however, were unable to pursue their progress owing to their heavy losses. From the German frontier to the Volga, hardly a town survived the passage of this tornado of war. In 1242 Batu Khan was recalled to Asia by the news of the death of Ogotai. He died about 1255. In his campaigns, Batu's main army was preceded by a body of 40,000 men, who cut roads and acted as pioneers through the terribly difficult country. The secret of the military success of the Mongols was the incredible speed with which they marched, often covering, it was said, a distance of nearly 300 miles in three days. The khanate which Batu governed was Kipchak, a region extending from the Jaxartes in Turkestan to the limits of Russia of the Thirteenth Century, and comprising the region north of the Caucasus. Batu's army was named the Golden Horde (q.v.), because of his tent, which was richly covered with embroidery and gilded leather. The *sira ordu*, or silken palace, made the great encampment by the Volga known as Serai, the capital of the Golden Horde. The cause of the Mongol success lay in the fact that the whole Tartar nation was a standing army, which struck Europe in a time of feudalism, when patriotism was parochial, Russia without national unity, only the nobles and free men armed, and the number of monks, hired servants, and slaves in overwhelming majority. On the other hand, the Tartar cavalry was superbly disciplined, with admirable tactics, while their weapons were far superior to anything then known in Europe. Their arrows were longer and heavier, and their engineering skill far in advance of that of their foes. Their horses were of the Tartar breed, which could find food for themselves by brushing the snow away with their noses, where Western horses would starve. Consult: Howorth, *History of the Mongols* (London, 1880), and Hammer-Purgstall, *Geschichte der Goldenen Horde in Kiptschack* (Pesth, 1840).

BATUM, bȧ-tōōm′, or **BATOUM.** Formerly a Turkish fortified city, now a Russian port on the southeastern shore of the Black Sea, about 8 miles north of the Turkish frontier (Map: Russia, F 6). The Berlin Congress of 1878, in sanctioning the cession of Batum to Russia, stipulated that it should not be made into a naval station, but should remain an essentially commercial port. It remained a free port until 1886. The harbor is one of the best on the east coast of the Black Sea. The climate is warm and mild, almost tropical; lemons, oranges, camelias, and even palms thrive in the open air. The city has but few well-appointed houses, and its sanitary conditions are very imperfect. An extensive trade is carried on, Batum being a great emporium for the export of petroleum, wheat, manganese ore, and other articles from Transcaucasia. It is the seat of a United States consul. Population, in 1889, 23,200; in 1897, 28,509, composed chiefly of Russians, Turks, Greeks, Armenians, and Persians.

BATWA, bät'wä. A pygmy tribe in the mountainous country of the Wissmann Falls district, southern-central Africa. According to Verner, they are sometimes less than 4 feet high; their heads are small and well shaped, their eyes small, bright, and deeply set, and their color chocolate; they are trimly built and symmetrical, with leg muscles well developed, and arms less so; the feet and hands are small and well formed; the hair is kinky, and there is no beard. The villages are not regularly laid out; the houses are beehive-shape. The Batwa are under the protection of the Bakuba, who have taught them to cultivate a few vegetables. They are by habit meat-eaters. In addition larvæ of insects and wild roots are eaten. Their weapons are bows, arrows, and knives. The boys are taught to hunt and the girls dig edible roots. Household furniture consists of a few Bakuba earthen pots, a bed of sticks woven together, baskets, quivers, nets, and bamboo fish-traps. They do not make pottery, weave, or work metals, and have no musical instruments. The bruised root of a species of Euphorbia furnishes arrow-poison. Their knowledge of the habits of wild animals is remarkable, and sight, smell, and hearing are well developed. They are monogamous, and faithful and affectionate toward their children. Charms and amulets are worn. In their funeral customs the men abstain from hunting and dancing, while the women remain in the huts and weep.

BATYUSHKOFF, bä'tūsh-kôf, KONSTANTIN NIKOLAYEVITCH (1787-1855). A Russian elegiac poet. He was born at Vologda and educated at Saint Petersburg. Here he mastered the Italian, German, and French languages, and very early began to write poetry. He entered the military service: took part in 1807 in the Niemen campaign; later was in Finland, and entered Paris with the Army of the Allies in 1814. His unbounded admiration for Voltaire and France had received a rude shock when Moscow was burned by 'the modern Vandals;' but the sight of Paris made him forget it all, and he immediately went to Voltaire's grave. In 1818 he was appointed attaché of the Russian Embassy at Naples, and the dream of his life—to visit sunny Italy—was realized; but his happiness did not last long. In 1822 he fell a victim to a brain disease, after years of mental aberration. In addition to his elegies, of which the chief is, perhaps, *The Death of Tasso*, his original works include epistles and narrative and lyric poems. He also made excellent translations from the Latin of Tibullus, the French of Parny, the Italian of Petrarch, and the German of Matthisson. His whole life was devoted to the formal perfection of Russian poetry—a struggle from which he came out victorious—so that he is the real teacher of Pushkin in this respect. The best edition of his works is that by his brother, P. N. Batyushkoff (3 vols., Saint Petersburg, 1834), with an exhaustive biography by L. N. Maykoff and commentaries by the latter and V. I. Savitoff.

BAUAN, bou'än, or **BAUANG**, bou'äng. A town of Luzon, Philippines, in the Province of Batangas (Map: Luzon, F 12). It is situated on the Bay of Batangas, about 4 miles northwest of Batangas, the capital of the province. Population, in 1898, 39,659.

BAU'BO (Gk. *βαυβώ*, *Baubō*). A mythical woman of Eleusis, whom Hesychius calls "the Nurse of Demeter," and about whom there are many stories. These seem to have been the inventions of later times, coined for the purpose of giving a mythical origin to the jokes in which women used to indulge at the festival of Demeter. She was in some way connected with the Eleusinian Mysteries, and is introduced by Goethe into the second part of *Faust* as the type of feminine lust.

BAUCHER, bō'shä', FRANÇOIS (1796-1873). A French hippologist, born in Versailles. He published a new system of equestrian training, under the title of *Méthode d'équitation basée sur des nouveaux principes* (Paris, 1867)—a unique work, which occasioned considerable comment, and which has been translated into several European languages (English translation under the title *A New Method of Horsemanship*, Philadelphia, 1856). Under Napoleon III. Baucher was appointed to a position in the imperial *manége*.

BAU'CIS. See PHILEMON AND BAUCIS.

BAUDELAIRE, bōd'lâr', CHARLES (1821-67). A French poet, born in Paris, April 9, 1821. He was the forerunner of the decadent school in modern French poetry, and in his kind greater than any of his successors. His parents sought to turn him from literature by travel in the Orient, and, as might have been foreseen, confirmed him in his perversity. The imagery, the colors, the odors of those scenes, that splendid nature, new and strange, fired his eccentric imagination and seemed to command a poetic expression. Yet at first this morbid hyperæsthesia, which was to rise at times to emotional hysteria, was controlled by a strong critical bent. Baudelaire's early essays show remarkable keenness and prescience of the trend of lyric poetry, and his translations of Poe's *Tales* (1856) made that author almost as much a classic of French as of American romantic fiction. But Baudelaire's cardinal work in French literature is the *Fleurs du Mal* (*Flowers of Evil*), 1857, in which the restless reaction from the confident outlook of scientific determinism finds its first, its most morbidly pessimistic, and possibly its strongest expression. Baudelaire lived for ten years longer, "cultivating hysteria with delight and terror," as he tells us, and died in a hospital at last after a year of semi-lunacy induced by the excessive use of nervous stimulants. Baudelaire's topsy-turvy ethics regard nature as evil, the natural as ugly, decay as a release, and death as a blessing. Possibly he was insincere: certainly he was intentionally brutal, and strained after effects in "the last convulsions of expiring individualism," as though drunk with the lees of romantic wine. There are 151 of these rank night-shade *Flowers*, all short poems, compactly built, with a mastery of technique unsurpassed in France, carefully polished and elaborated moral paradoxes, in which a shuddering at the vileness of life alternates with futile aspirations for an emancipation from it. For even while Baudelaire worshiped Satan, he clung to the Cross, and became toward the close of his life as morosely ascetic in resolution as he was extravagantly hedonistic in action. In his prose, as in his verse, the philosophy of science and the ethics of materialism coexist with the mysticism of mediæval demonology. His ethics are pessimism reduced to the absurd, his æsthetics are a reduction to the absurd of art; yet his poetry, in spite of all its artistic theory and ethical teaching, has a perverse poisonous originality that like arsenic preserves his memory green. The *Fleurs du Mal* have scattered their seeds wide, and Baudelaire is justly called the father of the decadent Symbolists. See Baudelaire's *Works*, with a preface by Gautier (7 vols., 1868). Consult: James, *French Poets and Novelists* (London, 1884); Asselineau, *Charles Baudelaire, sa vie et son œuvre* (Paris, 1889); Brinton, "A Poet of the Decadence," in *New Century Review* (London, 1897).

BAUDENS, bō̇'däɴ', Jean Baptiste Lucien (1804-57). A French surgeon. He was born at Aire, in the Department of Pas-de-Calais, and studied at the medical school in Paris. In 1823 he became connected with the hospital at Lille, and afterwards lived in Strassburg. In 1826 he was made a surgeon to the military hospital in Paris, and from 1830 acted as army surgeon at Algiers, where he founded a hospital for instruction. His writings include: *Clinique des plaies d'armes à feu* (1836) and *Nouvelle méthode des amputations* (1842). His original contributions consisted mainly in improvements of the surgical treatment of bullet wounds.

BAUDHAYANA, bou-dä'yȧ-nȧ. An early Hindu teacher or lawgiver. See Apastamba; Gautama; Vasishta.

BAUDIN, bō'däɴ', Charles (1784-1854). A French admiral, born at Sedan. In an engagement fought in Indian waters between the French ship *Sémillante* and the English frigate *Terpsichore*, in 1808, he lost an arm, and was shortly afterwards promoted lieutenant of the vessel. In June, 1812, while convoying a fleet of 12 French transports laden with ammunition to Toulon, he was pursued by English cruisers, but effected his escape, and subsequently inflicted heavy damage upon a brig attached to the English squadron. After the battle of Waterloo, Baudin volunteered to conduct the Emperor successfully through the cordon of English cruisers that guarded the coast of France. He was appointed rear-admiral in 1838, and was intrusted with the command of the fleet of 23 vessels sent against Mexico, and on November 27, 1838, bombarded San Juan de Ulúa, the defenses of Vera Cruz, which capitulated the following day. He retired from active service in 1849.

BAUDISSIN, bou'dĭs-sĭn, *Fr. pron.* bō̇'dē̇'săɴ', Wolf Heinrich, Graf von (1789-1878). A German author, born at Rantzau, in Holstein. He entered the diplomatic service of Denmark in 1810, and became secretary of legation successively at Stockholm, Vienna, and Paris. In 1827 he settled at Dresden, where he collaborated with Tieck in his famous German translation of Shakespeare. The following plays were translated by Baudissin, and were revised and annotated by Tieck: *Othello; King Lear; Much Ado About Nothing; Comedy of Errors; Taming of the Shrew; Measure for Measure; All's Well that Ends Well; Troilus and Cressida; Love's Labor's Lost; Merry Wives of Windsor; Titus Andronicus; Antony and Cleopatra.* Among Baudissin's other German translations are the comedies of Molière (4 vols., 1865-67).

BAUDISSIN, Wolf Wilhelm, Graf von (1847—). A German theologian, born at Sophienhof, Holstein. He studied at Berlin, Erlangen, Leipzig, and Kiel, and was professor at Strassburg from 1876 to 1881. From 1881 to 1900 he was professor at Marburg, and in the latter year was called to Berlin. He has published: *Translationis Antiquæ Arabicæ Libri Jobi quæ Supersunt* (1870); *Studien zur semitischen Religionsgeschichte* (1876-78); *Die Geschichte des alttestamentlichen Priesterthums untersucht* (1889); *August Dillmann* (1895).

BAUDRILLART, bō̇'drē̇'yär', Henri Joseph Léon (1821-92). A French political economist and author. He was born in Paris, studied at the Collège Bourbon, and after 1855 was editor of the *Journal des Economistes*. In 1866 he was appointed professor of history and political economy in the Collège de France, in 1869 general inspector of libraries, and in 1881 a professor in the Ecole des Ponts et Chaussées. He published: *Manuel d'économie politique* (1857); *Les populations agricoles de la France* (1880-88), and other works.

BAUDRY, bō̇'drē̇', Paul Jacques Aimé (1828-86). A French painter. He was born at La Roche-sur-Yon, Vendée, and became a pupil of Drölling in Paris, whither he was sent with a stipend from his native city. Having won the Grand Prix in 1850, he studied in Rome, forming himself especially after the great Venetian masters. After his return he speedily rose to the front rank among contemporaneous artists, became a member of the Institute in 1870, and commander in the Legion of Honor in 1875. He excelled as a decorative painter, his works in the grand foyer of the Opera House in Paris ranking among the most brilliant creations of modern art. They were executed in 1866-74. His masterpiece, however, is "The Glorification of the Law," adorning the ceiling in the Palace of Justice. This brought him the Medal of Honor in 1881. Among his other works the best are: "Fortune and the Child" (1853); "Saint John the Baptist;" "Execution of a Vestal" (1855); "Toilet of Venus" (1859); "Charlotte Corday" (1861); "The Pearl and the Wave" (1863). He was also greatly esteemed as a portrait painter.

BAUER, bou'ẽr, Adolf (1855—). An Austrian historian, born at Prague. He studied at the universities of Vienna, Berlin, and Bonn, and in 1891 was appointed professor of ancient history at the University of Gratz. The most important of his publications are: *Die Entstehung des Herodotischen Geschichtswerkes* (1878); *Themistokles* (1881); *Die griechischen Kriegsalterthümer* (1886); *Litterarische und historische Forschungen zu Aristoteles' 'Αθηναίων Πολιτεία* (1891); and *Die Forschungen zur griechischen Geschichte 1888-98* (1899).

BAUER, Anton (1772-1843). A German jurist and criminalist, born at Marburg. He was appointed professor at Göttingen in 1813. He is known as the originator of a theory of punishment according to which punishment finds its justification in the warning conveyed by the penalty. His works include: *Grundsätze des peinlichen Rechts* (Marburg, 1806), later published as *Lehrbuch des Strafprozesses*, the first text-book of the science, and *Die Warnungstheorie* (Göttingen, 1830).

BAUER, Bruno (1809-82). A rationalistic German critic. He was born at Eisenberg, in the Duchy of Saxe-Altenburg, on September 6, 1809. He was the son of a porcelain painter, and studied at the University of Berlin, where he became privatdocent in the theological faculty in 1834. He was transferred to the University of Bonn in 1839, but was deprived of his lectureship in 1842 on account of his rationalistic boldness. He then removed to Berlin, and for many years devoted himself to the destructive criticism of the Scriptures until, having to his own satisfaction shown that they had no authority, he abandoned such studies, and devoted himself chiefly to historical and critical publications. His writings are very numerous. All of them exhibit great learning, industry, research, and acumen, but are completely antagonistic to the received opinions in theology or to any form of evangelical religion. For instance, in his *Christus und die Cäsaren* (Berlin, 1877, 2d ed. 1879), he claims that Christianity was really founded by Seneca! He is generally admitted to be quicker in the discovery of error than of truth. He died at Rixdorf, a suburb of Berlin, April 15, 1882.

BAUER, Edgar (1820-86). A German publicist, brother of Bruno Bauer, born at Charlottenburg. He studied theology and jurisprudence at Berlin, and divided his time between travel, literary work, and conflicts with the law. He served a term of imprisonment for having written *Der Streit der Kritik mit Kirche und Staat*, which was confiscated by the Prussian authorities, but was afterwards republished in Bern (1843). His other writings include *Die Rechte des Herzogtums Holstein* (1863); *Die Deutschen und ihre Nachbarn* (1870); and numerous other works of a historical or polemical character.

BAUER, Georg. See Agricola.

BAUER, Karoline (1807-77). A German actress. She was born at Heidelberg, March 29, 1807, made her début at Karlsruhe in 1822, and had achieved a brilliant success there and at Berlin in both comedy and tragedy, when in 1829 she married in London Prince Leopold of Coburg, afterwards King of the Belgians. Their morganatic union was brief and unhappy. In 1831 she returned to the stage, which she quitted only upon her marriage to the Polish Count Ladislas de Broel Plater, in 1844. Thereafter she lived in Switzerland, where she died at Zürich, October 10, 1877. Her *Posthumous Memoirs*, translated into English (1884) with their denunciations of King Leopold and Baron Stockmar, offer a striking contrast to the two pleasing volumes of theatrical reminiscences that had preceded them in 1876 and 1877.

BAUER, Klara (known also by the pen-name *Karl Detlef*) (1836-76). A German writer of fiction, born at Swinemünde (Pomerania). She became a teacher of pianoforte method at Saint Petersburg, where for a time she resided in the house of Bismarck, then Minister to Russia. Her writings, distinguished by considerable stylistic merit and skill in the delineation of character, include *Unlösliche Bande* (1869; 3d ed., 1877); *Musste es sein?* (2 vols., 1873; 2d ed., 1875); and *Ein Dokument* (1876; 2d ed., 1878).

BAUER, Louis (1865—). An American astronomer and magnetician, born in Cincinnati, Ohio. He graduated at the University of Cincinnati in 1888, and was appointed astronomical and magnetic computer of the United States Coast and Geodetic Survey. In 1895-96 he was instructor in mathematical physics at the University of Chicago, in 1896-97 instructor there in geophysics, and from 1897 to 1899 associate professor of mathematics and mathematical physics at the University of Cincinnati. He also became chief of the territorial magnetism division of the United States Coast and Geodetic Survey.

BAUERNFEIND, bou′ẽrn-fīnt, Karl Maximilian von (1818-94). A German engineer, born at Arzberg (Franconia). He studied at Nuremberg and Munich, and in 1846 was appointed professor of geodesy and engineering science in the School of Engineering at Munich. In 1868-74 and 1880-83 he was director of the Technical College of Munich, originally organized according to plans devised by him. He retired in 1890. He was the inventor of the prismatic cross, extensively used in surveying. His original investigations were very extensive. Among his numerous works are *Zur Brückenbaukunde* (1854; revised ed. 1878) and *Zur Wasserbaukunde* (1866).

BAUERNFELD, bou′ẽrn-fĕlt, Eduard von (1802-90). An Austrian playwright and poet, born in Vienna. He was a friend of Grillparzer and of Franz Schubert, for whose opera, *Der Graf von Gleichen*, he wrote the libretto. His works, which were varied, included political fiction, poetry, serious drama, and many very successful comedies. These last are marked by clever dialogue and skillful characterization, and include *Die Bekenntnisse* (1834), *Bürgerlich und Romantisch* (1835), *Grossjährig* (1846), *Krisen* (1851), and *Aus der Gesellschaft* (1866). He was less successful in serious drama. His *Gesammelte Schriften* appeared in Vienna in 1871-73. For his biography consult Stern (Leipzig, 1891) and Horner (Leipzig, 1900).

BAUGÉ, bō′zhā′. The chief town of an arrondissement in the Department of Maine-et-Loire, on the Cousenon, 22 miles northeast of Angers. It contains a fine old castle of the Fifteenth Century, formerly the seat of the dukes of Anjou, and is notable as the scene of an English defeat in 1421, at which time their leader, the Duke of Clarence, was killed. Population, in 1896, 3344.

BAUHIN, bō′ăN′, Gaspar (1560-1624). A Swiss botanist and anatomist. He was born in Basel, and became professor of anatomy and botany there in 1588. In 1614 he was made professor of medicine. His most important work is the *Pinax Theatri Botanici* (1623). His work on anatomy, entitled *Theatrum Anatomicum* (1621), has considerable historical value.

BAUHIN, Jean (1541-1613). A Swiss botanist, brother of Gaspar Bauhin. He devoted his life to the study of botany, and published many excellent works, the most important and best known of which is his *Historia Universalis Plantarum Nova et Absolutissima*, completed by others and published after his death.

BAUHIN′IA (after the botanist Bauhin). A genus of plants of the natural order Leguminosæ. The leaves are generally divided into two lobes. The species, of which there are about 200, are natives of the warmer regions of both hemispheres, and some of them are remarkable for the size and beauty of their flowers. Most of them are twining plants or lianas, stretching from tree to tree in the tropical forests; but some are small trees, as *Bauhinia porrecta*, the mountain ebony of Jamaica, so called from the color of its wood. The inner bark of the Maloo climber, *Bauhinia racemosa*, or *Bauhinia scandens*, and of *Bauhinia parviflora*, East Indian species, is employed for making ropes. *Bauhinia retusa* and *Bauhinia emarginata*, also East Indian, exude a brownish colored mild gum; while the astringent bark of *Bauhinia variegata* is used in Malabar for tanning and dyeing leather, and also in medicine. The flower-buds are often pickled. The leaves of various species are used in Brazil as demulcent medicines, having mucilaginous properties. *Bauhinia splendens*, known as chain-creeper, is common in South America. Its stems are very flexible and are of great utility.

BAUMANN, bou'män, Alexander (1814-57). An Austrian playwright and composer, born in Vienna. He first became distinguished through his songs and romances in the dialect of Lower Austria, and afterwards devoted himself to dramatic composition, his comedies being especially popular. They include *Beiträge für das deutsche Theater* (1849), *Singspiele aus den österreichischen Bergen* (1850), among which the well-known *Das Versprechen hinterm Herd* has maintained its popularity; *Ehrenbuschn für d' Oesterreicher Armee in Italien* (1854); *Gebirgsbleameln* (8 books); and *Aus der Heimat.*

BAUMANN, Oskar (1864—). A German African traveler, born in Vienna. After study in Vienna and Leipzig, he accompanied Lenz (1885) on the latter's journey up the Congo River to Stanley Falls. In 1886 he explored Fernando Po, in 1888 accompanied an expedition to Kilimanjaro, and in 1890 was sent out by the German East African Society for the exploration of parts of East Africa. During 1892-93 he was the leader of an expedition to Victoria Nyanza, explored the region to the south and west of that lake, and ascertained that the Kagera River, which takes its rise in the Mountains of the Moon, is the lake's chief tributary.

BAUMANNSHÖHLE, bou'mäns-hē'le (Ger., builder's cave). A cavern of the Harz Mountains in Brunswick, the existence of which has been known for hundreds of years. It is 150 feet above the Valley of the Bode. Its stalactites bear quaint names, among which are 'The Praying Nun' and 'The Lion.'

BAUMBACH, boum'bäG, Rudolf (1840—). A German poet and novelist. He was born at Kranichfeld, studied natural science at Würzburg and Leipzig, Freiburg and Heidelberg, and afterwards lived in Austria till 1885, when he moved to Meiningen. He has been most successful in poetic tales based on popular legends of German and the Slavonic Alps: *Zlatorog* (1875), *Horand und Hilde* (1879), *Frau Holde* (1881), *Der Pate des Todes* (1884), *Kaiser Max und seine Jäger* (1888). He has published seven volumes of lyrics, of which *Lieder eines fahrenden Gesellen* (1878) and *Thüringer Lieder* (1891) are characteristic. His most noteworthy novel is *Trug-Gold* (1878), an historical romance of the Seventeenth Century. He also wrote the fairy-stories, *Sommermärchen* (1881) and *Es war einmal* (1889).

BAUMÉ, bō'mā', Antoine (1728-1804). A French chemist, known for his discoveries in applied chemistry. He became professor in the college of pharmacy in Paris, and founded a large establishment for the preparation of drugs. He published many papers on the application of scientific principles to useful purposes in the arts and manufactures. Among his inventions and improvements were processes for bleaching, purifying saltpetre, manufacturing sal-ammoniac, etc. His publications include: *Eléments de pharmacie* (1762) and *Chimie expérimentale et raisonnée* (3 vols., 1773). Baumé's areometer is still in common use in laboratories.

BAUMEISTER, bou'mī-stēr, Johann Wilhelm (1804-46). A German veterinarian, born at Augsburg. In his youth he received extensive training in animal painting, and afterwards studied and practiced veterinary medicine. In 1839 he was made professor at the School of Veterinary Medicine at Stuttgart. His published works include: *Handbuch der landwirtschaftlichen Tierkunde und Tierzucht* (1863), a part of which, under the title *Anleitung zur Kenntnis des Aeussern des Pferdes*, passed through the seventh edition in 1891. Other parts, too, of the *Handbuch* have been published separately, and have passed through several editions. The work was beautifully illustrated by the author.

BÄUMELER, boi'me-lēr, or **BIMELER**, bē'me-lēr, Joseph Michael (1778-1853). The leader of the German 'Separatists,' who founded the settlement of Zoar, Ohio, in 1817. He was born in Württemberg, Germany, received a good education, and soon identified himself with a group of mystics in his native State, who became known as the Society of Separatists. In 1817 he was chosen leader of the company of about 300 which emigrated to America, and settled at Zoar, and until his death he exercised an almost autocratic control over them. Outside the community he was generally known as 'King Bimeler,' while his fellow Separatists were commonly called 'Bimelers.' He was at first opposed to the introduction of communism, but finally yielded to the wishes of his associates, and was largely responsible for the successful working of the system. For forty years he was both the spiritual and the temporal leader, and with his death the community began gradually to decline. A number of 'discourses' delivered by him in 1832 were published under the title *Die wahre Separation, oder die Wiedergeburt, dargestellt in geistreichen und erbaulichen Versammlungs-Reden und Betrachtungen, besonders für das gegenwartige Zeitalter anwendbar, gehalten in der Gemeinde in Zoar im Jahre 1832* (3 vols., Zoar, 1856), and subsequently formed the basis for a large part of the devotional exercises of the community, exercising an influence among them greater even than that of the Bible.

BAUMGARTEN, boum'gär-ten, Alexander Gottlieb (1714-62). A German philosopher of the school of Wolff. He was born in Berlin, and studied at Halle. In 1738 he became privatdocent at Halle, and in 1740 professor of philosophy at Frankfort-on-the-Oder, where he died.

His text-books in philosophy were much used, and Kant made them for a while the basis of his own lectures. The cleverness of his style made him an important contributor to modern philosophical terminology. Among other philosophic subjects, he contributed an interesting work on æsthetics; but the claim often made that he is the founder of modern æsthetic theory cannot be granted unqualifiedly. Concerning his significance in the history of æsthetics, see Æsthetics. His most important works were: *Metaphysica* (1739), reissued by Eberhard (1789); *Ethica Philosophica* (1740); *Æsthetica* (2 vols., 1750-58; left unfinished); *Philosophica Generalis* (ed. by Förster, 1770). Consult: H. G. Meyer, *Leibniz und Baumgarten als Begründer der deutschen Æsthetik* (Halle, 1874); and J. Schmidt, *Leibniz und Baumgarten* (Halle, 1875).

BAUMGARTEN, Hermann (1825-93). A German historian, born at Lesse (Brunswick). In 1842-48 he studied at Jena, Halle, Leipzig, Bonn, and Göttingen. In 1861-72 he was professor of history and literature at the Polytechnikum at Karlsruhe, and in 1872-89 at the University of Strassburg. His publications include: *Geschichte Spaniens zur Zeit der französischen Revolution* (Berlin, 1861); *Geschichte Spaniens vom Ausbruch der französischen Revolution bis auf unsere Tage* (1865-71); and *Karl V. und die deutsche Reformation* (1889).

BAUMGARTEN, Michael (1812-89). A German theologian, born in Haseldorf (Holstein). He studied at the University of Kiel, in 1846 became pastor at Schleswig, and in 1850 professor of theology at Rostock. Although admittedly orthodox in his views, he strongly opposed the Lutheran hierarchy, and was in 1856 removed from the board of theological examiners and in 1858 deprived of his professorship. In 1865 he assisted in founding the Protestantenverein. The more important of his works are his *Apostelgeschichte* (2d ed., 2 vols., 1859); *Die Geschichte Jesu* (1859); *Schleiermacher als Theolog* (1862); and *Doktor Martin Luther: ein Volksbuch* (1883). Consult his autobiography, edited by Studt (Kiel, 1891).

BAUMGARTEN-CRUSIUS, boum′gär-ten-kr͞oo′zē-ụs, Ludwig Friedrich Otto (1788-1843). A German theologian. He was born at Merseburg, July 31, 1788, and died at Jena, May 31, 1843. He studied theology at Leipzig, and in 1810 became university preacher. In 1812 he was appointed professor extraordinary of theology at Jena, in 1817 full professor of theology, and always distinguished himself as a champion of religious liberty, on behalf of which he wrote various treatises. In 1820 appeared his *Introduction to the Study of Dogmatics* (Leipzig, 1820), a work of considerable originality and wealth of thought. More complete exhibitions of his opinions are to be found in his *Manual of Christian Ethics* (Leipzig, 1826); *Outlines of Biblical Theology* (Jena, 1828); and *Outlines of Protestant Dogmatics* (Jena, 1830). In 1831-32 he published a *Text-Book of the History of Doctrines;* in 1834, a work on *Schleiermacher, His Method of Thought, and His Value;* and also *Considerations on Certain Writings of Lamennais.* After his death, Kimmel published the whole of his exegetical prelections on the Gospels and Pauline Epistles, and H. Hase completed from his notes his *Compendium der christlichen Dogmengeschichte* (2 vols., Leipzig, 1840-46).

Baumgarten was conspicuous for the breadth and solidity of his learning, the originality of his spirit, and the acuteness of his understanding, but was nevertheless deficient in clear and vivid expression. He attached himself to no school, theological or philosophical. At an early period he had been greatly influenced by the metaphysics of Schelling, from which, however, he ultimately emancipated himself. His thinking was to a certain extent rationalistic, but on the whole approached more closely to the direction of the spiritual Schleiermacher.

BAUMGARTNER, boum′gärt-nēr, Alexander (1841—). A Swiss Jesuit writer, born at Saint Gall. He entered the Jesuit order in 1860, and completed his theological studies at Münster, Maria-Laach, and Ditton (England). He then studied Scandinavian literature in Copenhagen and Stockholm. In several of his works he seeks to depreciate the German classicists. His writings of this character include: *Goethes Jugend* (1879); *Goethe und Schiller* (1886); and *Der Alte von Weimar* (1886). He has also written a translation from the ancient Icelandic of Eystein Asgrimsson; a festival play on the Spanish poet, *Calderon* (1881); *Longfellows Dichtungen* (1878); and a history of the world's literature in eight volumes (1897).

BAUMGARTNER, Andreas, Baron von (1793-1865). An Austrian statesman and scientist. He was born at Friedberg, in Bohemia, and studied at the University of Vienna, where in 1823 he became professor of physics. While filling this office, he gave popular lectures on Sundays upon mechanics for artisans and operatives, which met with much approbation. A result of these lectures was his *Mechanik in ihrer Anwendung auf Künste und Gewerbe* (2d ed., Vienna, 1823) and his *Naturlehre* (Vienna, 1823). Ill health forced him to resign his professorship, and he was appointed director of the imperial porcelain manufactories, and afterwards superintendent of the Austrian tobacco manufactories. In the year 1846 the establishment of the electric telegraph was committed to him, and in the following year he was placed in charge of the construction of the Austrian railways. In 1848 he became Minister of Public Works; in May, 1851, he was appointed Minister of Commerce, and in December of the same year Minister of Finance. In 1855 he was appointed president of the Austrian Academy of Sciences, of which he had been vice-president for a number of years, and in 1861 he was called to the House of Peers of the Reichsrath. He published, in 1862, *Chemie und Geschichte der Himmelskörper nach der Spektralanalyse;* in 1864, *Die mechanische Theorie der Wärme.* Consult Schröter, *Freiherr von Baumgartner, Eine Lebensskizze* (Vienna, 1886).

BAUMGARTNER, Gallus Jakob (1797-1869). A Swiss statesman and historian, born at Altstätten (Canton of Saint Gall). He studied at Freiburg and Vienna, and was prominent in the political affairs of his canton, the revision of whose Constitution he promoted. As a member of various representative bodies of the canton and the Confederation, he was a leader of the Liberals until 1841, when he occasioned much surprise by his alliance with the Ultramontane Party. In 1859-64 he represented his canton in the Council of States. He founded in 1842 the *Neue Schweizer Zeitung*, and published several historical works, of which the most extensive and important is *Die Schweiz in ihren Kämpfen und Umgestaltungen von 1830-50* (4 vols., 1853-66). Consult Baumgartner, *Gallus Jakob Baumgartner und die neuere Staatsentwicklung der Schweiz* (Freiburg-im-Breisgau, 1892).

BÄUMKER, boim'kẽr, Wilhelm (1842—). A German writer on musical subjects, born at Elberfeld, Prussia. He studied at Münster and Bonn, and became a Roman Catholic pastor at Rurich. His most important work is *Das katholische deutsche Kirchenlied in seinen Singweisen* (3 vols., 1883-1901). He has published biographical and critical studies of *Palestrina* (1877); *Orlandus de Lassus* (1878); *Zur Geschichte der Tonkunst in Deutschland von den ersten Anfängen bis zur Reformation* (1881), and other volumes.

BAUMSTARK, boum'stärk, Anton (1800-76). A German philologist, born at Sinzheim, Baden. He was professor of philology at the University of Freiburg from 1836 to 1871. He published an edition of Curtius Rufus (Freiburg, 1829); of Cæsar, with commentary (Freiburg, 1832); and an important work entitled *Urdeutsche Staatsaltertümer* (Berlin, 1873). Some of his writings appeared under the pseudonym of Hermann vom Busche.

BAUMSTARK, Eduard (1807-89). A German political economist, brother of the preceding. He was born at Sinzheim, Baden; was educated at the University of Heidelberg; became professor in an academy of agriculture and political science at Eldena in 1842, and in the following year was appointed its director. He was a delegate to the Prussian National Assembly of 1848, and in the following year was elected a member of the Upper House of that body. He was subsequently a Liberal member of the Prussian Upper House and of the North German Diet. His writings deal chiefly with political economy, and include the following: *Kameralistische Encyklopädie* (1835); *Grundgesetze der Volkswirtschaft*, a translation of Ricardo's celebrated work (1877); *Zur Geschichte der arbeitenden Klasse* (1853).

BAUR, bour, Albert (1835—). A German historical painter. He was born at Aix-la-Chapelle, and studied with Sohn and Kehren at Düsseldorf and with Schwind at Munich. He was professor at the art school of Weimar from 1872 to 1876, but afterwards settled permanently at Düsseldorf. His principal works are: "The Body of Otho III. Conveyed Over the Alps" (1866); "Christian Martyrs" (Düsseldorf Gallery, 1870); "Paul Preaching in Rome" (1876); "Amazons Bear-Hunting" (1876); "Sealing Christ's Sepulchre After Entombment" (1879); "The Daughter of the Martyr" (1886).

BAUR, Ferdinand Christian von (1792-1860). A German theologian. He was born at Schmiden, near Stuttgart, June 21, 1792; studied theology in the Blaubeuren theological seminary from 1805 to 1809, and in the University of Tübingen from 1809 to 1817. In 1817 he became professor in the Seminary of Blaubeuren, where he gave the first indications of his abilities by publishing his *Symbolik und Mythologie oder die Naturreligion des Altertums* (Stuttgart, 3 vols., 1824-25), a work which indicates the influence of Schleiermacher over the author. In 1826 he was called to Tübingen, where he held the chair of Protestant theology. His whole life was consecrated to religious studies—the history of doctrines, the symbolism of the Church, and biblical exegesis. On account of the universality of his culture, the wonderful activity and fertility of his mind, his rare combination of speculative thought with solid knowledge, and that faculty of historic divination or insight which enabled him to draw decisive results from separate, obscure, and neglected data, he has been regarded by many in Germany as the most massive theological intellect since Schleiermacher. Unlike Bruno Bauer (q.v.), he made comparatively little use of the Hegelian philosophy in his writings; and when he did, it was professedly only that he might more clearly understand historical phenomena in their internal spiritual connection, and be enabled to represent the logical process of their development. His method of investigating the progressive history of religious opinion, however, incurred the reproach of formalism from its adversaries, who said that he applied it too rigorously, and made dogmas develop themselves with a kind of abstract inevitable regularity from previous historical conditions, without allowing for immediate and extraordinary providences. His most important works in the history of doctrine are *Die christliche Gnosis oder die christliche Religionsphilosophie* (Tübingen, 1835), a work which makes the Christian Gnosis of the Second and Third centuries the starting-point of a long series of religio-philosophical productions traceable uninterruptedly down through Middle-Age mysticism and theosophy to Schelling, Hegel, and Schleiermacher; *Die christliche Lehre von der Versöhnung* (Tübingen, 1838); and *Die christliche Lehre von der Dreieinigkeit und Menschwerdung Gottes* (Tübingen, 1841-43). In reply to Möhler, the celebrated Roman Catholic theologian, who had attacked the Protestant Church, he wrote *Der Gegensatz des Katholicismus und Protestantismus* (Tübingen, 1836). Besides these works, based on a historical treatment of religion, to which class also belongs his *Lehrbuch der christlichen Dogmengeschichte* (Stuttgart, 1847), he published various critical treatises on parts of the New Testament; such as *Die Christuspartei in der korinthischen Gemeinde; der Gegensatz des Paulinischen und Petrinischen Christenthums;* and *Der Apostel Petrus in Rom* (1831)—a work in which the author endeavors to demonstrate the existence of deep-rooted differences in that sphere of primitive Christianity in which we are accustomed to see nothing but unity and harmony. His inquiries concerning the Gnosis led him to study minutely the pastoral epistles, the result of which study was *Die sogenannten Pastoralbriefe des Apostels Paulus* (Stuttgart, 1835), in which he combats the idea that Saint Paul was their author, and refers them to the Second Century. Of a similar nature is his *Paulus, der Apostel Jesu Christi* (Stuttgart, 1845).

His work on the Gospel of John produced a startling effect, as up to Baur's time that Gospel had generally been held prior in date to the three synoptic Gospels, whereas

Baur strove hard to show that it was of post-apostolic origin. In 1847 appeared his *Kritische Untersuchungen über die kanonischen Evangelien, ihr Verhältniss zu einander, ihren Ursprung und Charakter.* In 1851 he published *Das Markusevangelium nach seinem Ursprung und Charakter.* In this and other similar works Baur maintained that we must extend our notions of the time within which the canonical writings were composed to a period considerably post-apostolic, which can only be determined approximately by a careful investigation of the motives which apparently actuated their authors. The chief characteristic, therefore, of the Tübingen School, as exhibited in the works of its founder, is the union of a subjective criticism with a strong conviction of the historic reality of the New Testament writings. He maintained that there were only four genuine Pauline epistles—Romans I. and II., Corinthians, and Galatians. Baur died in Tübingen, December 2, 1860. Of his writings, there have appeared in English translation: *Paul, the Apostle of Jesus Christ* (1873-75, 2 vols.): *The Church History of the First Three Centuries* (London, 1878-79, 2 vols.). For his biography, consult: *Worte der Erinnerung* (Tübingen, 1861); C. von Weizsäcker, *Ferdinand Christian Baur. Rede zur akademischen Feier seines 100. Geburtstages* (Stuttgart, 1892); also, in general, R. W. Mackay, *The Tübingen School and its Antecedents* (London, 1863); A. B. Bruce, *F. C. Baur and His Theory of the Origin of Christianity* (New York, 1886).

BAUR, Gustav Adolf Ludwig (1816-89). A German evangelical theologian, born at Hammelbach (Odenwald). He studied at the University of Giessen, was appointed professor there in 1847, and in 1870 became professor at Leipzig. His publications include: *Grundzüge der Homiletik* (1848); *Boëtius und Dante* (1874); *Die vorchristliche Erziehung* (1884; Vol. I., Schmid's *Geschichte der Erziehung*).

BAURE, bou′rȧ. A tribe of Arawakan stock living on the eastern slope of the Cordilleras, on one of the upper tributaries of the Beni River, in the Department of La Paz, Bolivia. About the year 1674 they were Christianized by Jesuit missionaries, and gathered into mission villages, together with the Moxos (q.v.).

BAUSE, bou′ze, Johann Friedrich (1738-1814). A German engraver, born at Halle. He studied with J. J. Hayd at Augsburg, and became professor at the Leipzig Academy of Art in 1766. He made more than 200 portraits of contemporary notables, including reigning princes, theologians, merchants, scholars, poets, and actors. Among the prominent names in this valuable collection are the following: Joseph II. (1762); Peter I. and Peter III., Czars of Russia (1786 and 1762, respectively); Catharine II. of Russia (1762); Frederick II., King of Prussia (1759); and the authors Gellert, Lessing, Mendelssohn, Leibnitz, Kant, Winckelmann, and Hagedorn.

BAUSMAN, bous′man, Benjamin (1824—). An American Reformed (German) clergyman, born at Lancaster, Pa. He graduated at Marshall College (1851), and at the Theological Seminary, Mercersburg, Pa. (1852). He became pastor at Reading, Pa., in 1863. His books include: *Sinai and Zion*, travels (1860); *Wayside Gleanings in Europe* (1878); *Bible Characters* (1893); edition of *Harbaugh's Harfe, a Volume of Poems in the Pennsylvania German Dialect* (1870).

BAUTAIN, bō′tăɴ′, Louis Eugène Marie (1796-1867). A French theologian and philosophic writer. He was born in Paris, and studied at the Ecole Normale Supérieure. At the age of 20 he was made professor at the College of Strassburg, and later held a professorship at the university of that city, but was suspended from office in 1822, on charges of heterodoxy. In 1848, however, he was made Vicar-General of the Diocese of Paris, and five years later professor of theology at the Sorbonne. His best-known writings include: *Art of Extempore Speaking* (1858-78); *De l'enseignement de la philosophie en France au XIXème siècle* (1833); *Philosophie du christianisme*, edited by Bonnechose (1835); *Psychologie expérimentale* (1839; a second edition under the title *L'esprit humain et ses facultés*, 1859); *Philosophie morale* (1842); *La liberté et la religion* (1848); *La morale de l'évangile comparée aux divers systèmes de morale* (1855), and *La philosophie des lois* (1860). Bautain held that divine revelation is the only possible criterion of truth on ethical subjects.

BAUTZEN, bout′sen, or **BAUDISSIN,** bou′dē-sēn (Wendish *Budyśin*, hut-city, from Slav. *buda*, hut, tent, Engl. *booth*). The capital of the Circle of the same name in the Kingdom of Saxony, and a thriving manufacturing town, known for its products of woolens and other textiles, leather, paper, metallic goods, etc. (Map: Germany, F 3). It is situated on rising ground overlooking the river Spree, about 30 miles east-northeast of Dresden, and surrounded by a wall and moat. The Cathedral of Saint Peter is used by both Protestants and Roman Catholics, the church being divided into two parts by a grating for that purpose. The Castle of Ortenburg, often the residence of the kings of Bohemia, is now occupied by Government offices. The city's affairs are administered by a municipal council of 24 members and an executive board of 7. (See Germany, *Local Government.*) There are numerous schools, three public libraries, a museum, and an art gallery. Bautzen is a place of considerable antiquity, and was first made a town under Otho I. in the Tenth Century. It suffered greatly in the war with the Hussites, and still more during the Thirty Years' War. It is celebrated as the place where Napoleon, with an army of 130,000 men, after an obstinate resistance, won a barren victory over 90,000 of the allied Russians and Prussians on May 20-21, 1813. The Allies lost in the two days 12,000 in killed and wounded, in addition to 1500 taken prisoners. The French left 5000 dead upon the field, and had over 15,000 wounded. Population, in 1890, 22,000; in 1900, 26,000.

BAUXITE, bōks′īt (from *Baux*; see below). The most important ore of aluminum, a hydrate having the composition $Al_2O_33H_2O$, though most occurrences contain also some silica, iron oxide, and titanium. The ore occurs in rounded grains, in pisolitic or claylike masses. The grains usually show a concentric structure and a variable color from white to yellow, brown, or red. It is named from its occurrence at Baux, in France, but it is also known from Styria and Carinthia, in Austria, and from Antrim, in Ireland. In the United States it occurs in a belt about 60 miles long, extending from northwestern Georgia into northeastern Alabama, and also in Arkansas, near Little Rock. The foreign deposits result from the chemical alteration of igneous rocks; the American deposits are thought to be hot-spring formations. Those of Alabama and Georgia are basin-shaped, and are limited vertically to points between 900 and 950 feet above sea-level. The composition of good-grade American ore is approximately as follows: Alumina, 57 to 62 per cent.; ferric oxide, under 1 per cent.; silica, 2.5 to 3 per cent.; titanic acid, 3 to 4 per cent.; water (combined), 20 to 30 per cent.; moisture, retained mechanically, 2 to 4 per cent. While bauxite serves chiefly as an ore of aluminum, it is also employed in the manufacture of alum, and for lining basic converters and Siemens-Martin furnaces in the manufacture of steel. Consult: Hayes, "Bauxite," *Sixteenth Annual Report United States Geological Survey*, Part 3 (Washington, 1895); *Mineral Industry*, Vol. II. (New York, 1893); Branner, "The Bauxite Deposits of Arkansas," *Journal of Geology*, Vol. V. (Chicago, 1897). See, also, the articles on ALUM and ALUMINIUM.

BAVA'RIA (Ger. *Bayern*). A kingdom and one of the constituent States of the German Empire, the largest in area and population next to Prussia. The Grand Duchy of Hesse divides Bavaria into two unequal parts. The eastern and by far the larger part, is bounded by Austria-Hungary on the east and south, Saxony, the Thuringian States, and Hesse-Nassau, on the north, and Württemberg, Baden, and Hesse on the west. The western portion, or Rhine Palatinate, is situated between Baden, Prussia, Alsace-Lorraine, and Hesse, and occupies only one-thirteenth part of the entire kingdom. The following table gives the area of Bavaria and its population in 1890 and 1900:

GOVERNMENT DISTRICTS	Area in sq. miles	Population in 1890	Population in 1900
Upper Bavaria	6,456	1,103,160	1,323,447
Lower Bavaria	4,152	664,798	678,584
Palatinate	2,289	728,339	831,533
Upper Palatinate	3,729	537,954	553,857
Upper Franconia	2,702	573,320	607,903
Middle Franconia	2,923	700,606	815,556
Lower Franconia	3,243	618,489	650,758
Swabia	3,788	668,316	713,515
Total	29,282	5,594,982	6,175,153

Bavaria may be described as a mountainous country, as almost all of its boundary lines are formed by mountain ranges. On the south it takes in a part of the eastern Alps, which form the three mountain ranges of Southern Bavaria: the Algäuer Alps; the Bavarian Alps, containing the highest summit of the German Empire, the Zugspitze (9725 feet); and the Salzburger Alps. Along the Bohemian frontier stretches the mountain range of Böhmerwald, with its offshoot, the Bayerischer Wald, running in a northwestern direction along the Danube. On the north rise the Fichtelgebirge, the Rhöngebirge, and in the northwest is the Spessart. The Franconian Jura traverses the west and centre. The interior of Bavaria is an elevated plateau, sloping toward the north, with a mean altitude of 1600 feet, and intersected in several directions by low hills. The largest mountain range in the Palatinate is the Hardt Mountains, which have an elevation of over 2200 feet.

Bavaria belongs mainly to the basin of the Danube, by which it is traversed through its entire width from west to east. The part of Bavaria south of the Danube is drained by the tributaries of that stream, the most important of which are the Iller, Lech, Isar, and Inn. The northern tributaries of the Danube in Bavaria are the Wörnitz, Altmühl, Naab, Regen, and Vils. The northwestern part of Bavaria is drained by the Main and its tributary the Regnitz. There are not a few lakes in the southern part of the kingdom, the most important of which are the Chiemsee, Starnberger See, and Ammersee, besides several mountain lakes, the most famous of which is Königsee, noted for its beautiful scenery. The most important canal of Bavaria is the Ludwigskanal, which connects the Altmühl, a tributary of the Danube, with the Main, a tributary of the Rhine, thereby serving as a connecting link between the North and the Black seas. Among the numerous mineral springs in Bavaria, the most famous are those of Kissingen and Reichenhall.

CLIMATE. The climate of Bavaria, although somewhat colder than that of the rest of Germany, is on the whole mild and salubrious. The average annual temperature ranges from about 49° F. in the valleys along the Danube, the Rhine, and the Main, to less than 44° F. in the mountainous regions, with very considerable fluctuations. The rainfall ranges from about 23.5 inches around the Hardt Mountains, in the centre of the Rhine Palatinate, to over 78 inches in the southern part of Bavaria proper.

MINERAL RESOURCES. The mineral deposits of Bavaria are of considerable variety, but not much mining is being done outside of coal and iron. The 15 chief collieries have an annual production of about 1,000,000 tons, valued at about $2,500,000. Other minerals are iron, salt, the famous lithographic stone of Solnhofen, graphite, and useful earths. The total value of the mineral output amounts to about $5,000,000, or less than 2 per cent. of the total mineral production of the Empire.

AGRICULTURE is of greater importance in Bavaria than in any other German State, and has reached there a degree of perfection surpassed only in a few countries. Threatened with keen competition of new countries with unlimited agricultural resources, the Bavarian landholder was compelled to adopt every available means in order to increase the productiveness of the soil. With this end in view, numerous associations were formed in almost every department of agriculture. The buying of seeds and agricultural machinery, storing of grain, raising of domestic animals, marketing of agricultural products, insurance of farm buildings and crops, and numerous other operations are all carried on largely through coöperative societies, which are rapidly growing in numbers and influence. A considerable proportion of the landholders are in the habit of insuring their crops. There were 211 agricultural loan and savings associations, with a membership of 21,753, in 1887; in 1897 their number had risen to 1797, with a membership of 162,562. In his struggle against foreign competition the Bavarian landholder has not been left entirely to his own efforts. The State has come to his assistance in offering him reduced rates on the transportation of agricultural products, machinery, and manure, in establishing agricultural banks, in improving the breed of domestic animals, and in opening agricultural schools. That all of these measures have helped to bring about a decided improvement in agricultural methods is shown by the enormous increase in the use of agricultural machinery in the last decades.

The chief crops in 1900, with the areas devoted to them, were as follows:

Products	Acres	Tons
Rye	1,377,539	791,706
Wheat	776,092	456,152
Barley	890,635	578,920
Oats	1,188,694	759,245
Potatoes	828,778	4,101,958
Hay	3,190,936	6,214,795
Hops	91,899	21,782

Besides these crops there are raised many industrial plants, such as tobacco, beets, and rape seed. There are more than 50,000 vineyards, occupying an area of about 56,000 acres. The vine-growing industry is, however, largely confined to the Palatinate, and shows little progress. Bavaria is one of the largest cattle-raising countries of Germany. The breeding of live stock is conducted with no less care and intelligence than the raising of grain, and numerous State studs are maintained for the purpose of improving the breed of horses.

The forests of Bavaria cover an area of about 6,250,000 acres, or about 33 per cent. of the total area of the kingdom, of which 49 per cent. belongs to private persons, 34 per cent. to the State, and the remainder mostly to the communities. The annual income derived from the forests through the sale of timber and the rent of grazing land amounts to about $8,000,000.

Manufactures. Bavaria is the largest beer-producing country in the world, and its beer has a world-wide fame. The output increased in the twenty-year period of 1880-99 from 310,000,000 to nearly 470,000,000 gallons, while the output of the Empire increased during the same period from nearly 1,025,000,000 to about 1,840,000,000 gallons, so that Bavaria produces over one-fourth of the total beer output of Germany. Comparing the output with the population, Germany produces only about 130 quarts of beer per head, while Bavaria produces more than 300 quarts. The textile and metal industries are developed to a considerable extent. There are also some large tobacco-factories, tanneries, and chemical-works. Among other important industries is the manufacture of earthenware, glass, agricultural implements, machinery, leather goods, and wooden articles. There are many establishments devoted to the polygraphic processes.

Commerce and Transportation. The chief article of export is beer, the quantity exported annually amounting to over 50,000,000 gallons. The railways of Bavaria, having a length of more than 4000 miles, are mostly owned or controlled by the State, only about 14 per cent. being in private hands. The navigation on the Danube, the Main, and the Lake of Constance is very active.

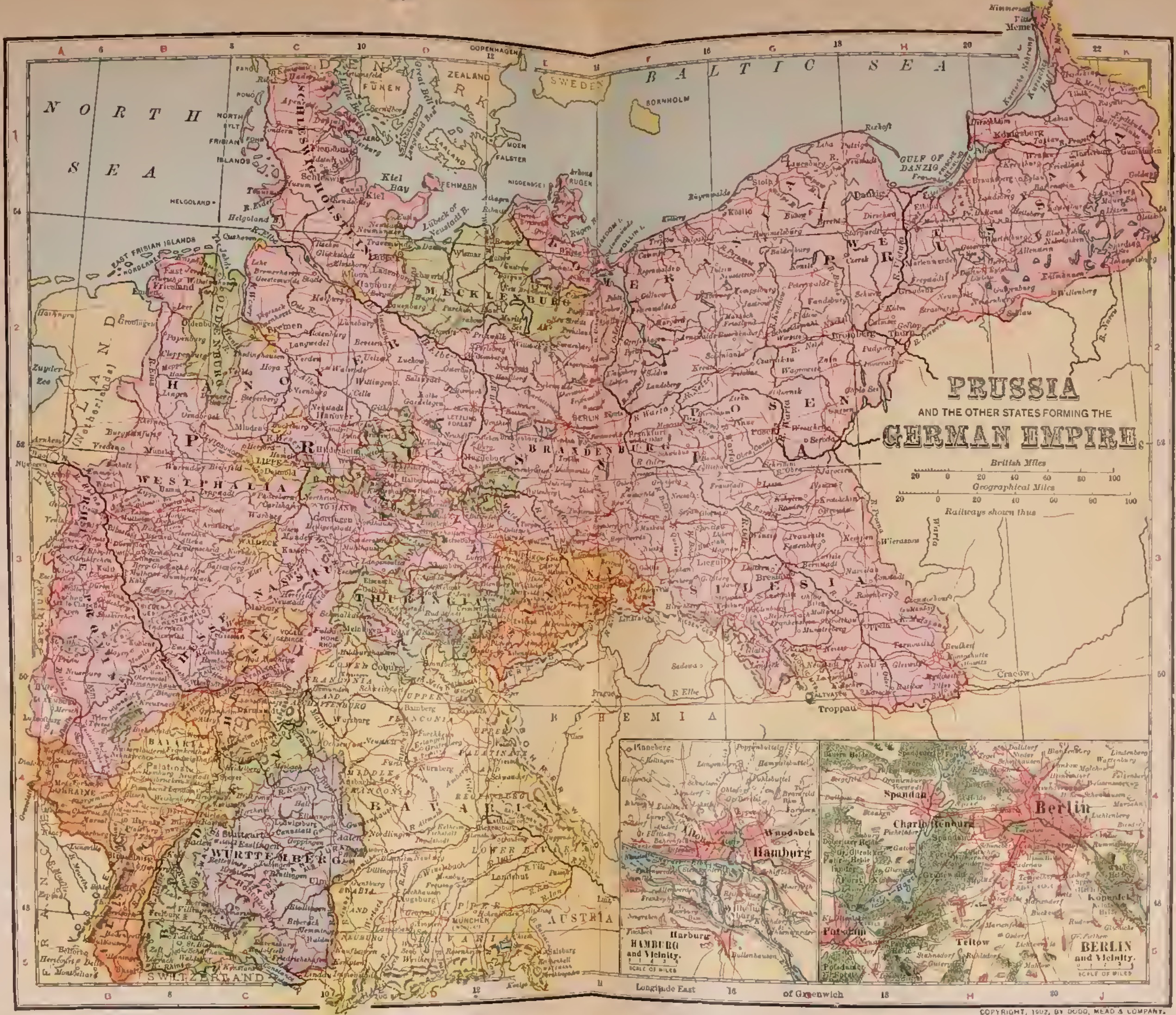
Government. In its form of government, Bavaria is a constitutional monarchy, the crown being hereditary in the male line. The Constitution of Bavaria was adopted in 1818. It has been modified since. The kingdom is perfectly independent in its internal affairs, having complete control of its army in time of peace, managing its own transportation and communication facilities, and the collection of revenue for its separate budget. It has embassies at the courts of a number of countries. The executive power is vested in the King, who is assisted by a responsible ministry of six members, and advised by a State Council. The legislative power is shared by the King with the Parliament (*Landtag*), which consists of two houses. The Upper House, or Chamber of Councilors of the Realm, is composed of 13 princes of the royal family, 3 crown dignitaries, 2 archbishops, the heads of 19 noble families of the realm, 1 bishop, the president of the Protestant Chief Consistory, 25 hereditary members, and 17 persons appointed for life by the King. The number of life members must not exceed one-third of the hereditary councilors. The president of the Upper House is appointed by the King. The members of the Lower House are elected for six years. The voting franchise is restricted by a property qualification. The Chamber of Deputies elects its own president and vice-president, and its sanction is necessary for almost every measure relating to the financial affairs of the realm. It enjoys the right of initiative to a considerable extent. In the Imperial *Bundesrat* Bavaria is represented by 6 members, and in the *Reichstag* by 48.

For purposes of local administration Bavaria is divided into eight circles or Government districts (*Regierungsbezirke*), subdivided into administrative districts. In every Government district there is a *Landrat*, consisting of representatives of the districts, the towns, the landed nobility, the clergy, and the university, if there be one, all elected for six years. The budget of Bavaria is fixed every two years. According to estimates for 1900 and 1901, the budget balanced at 432,919,989 marks (over $100,000,000), against 345,356,505 marks ($85,000,000) in 1896-97. The revenue is derived from public works, Imperial repayments, and indirect taxes. The chief items of expenditure are on account of administration, of the Empire, and of the public debt. The debt amounted at the end of 1899 to 1,460,173,215 marks (about $360,000,000), of which 1,115,000,000 marks ($278,000,000), or nearly 80 per cent., was railway debt.

Education is free and compulsory, and provided for by the State in a generous manner. There are three universities (at Munich, Würzburg, and Erlangen), a large number of secondary and special schools, and about 7400 elementary schools, with an attendance of about 830,000, or over 13 per cent. of the entire population.

Population. The population of Bavaria was 5,284,778 in 1880; 5,594,982 in 1890; and 6,175,153 in 1900. Over 70 per cent. is Roman Catholic, about 21 per cent. Protestant, less than 1 per cent. Hebrew, and the rest belongs to various Christian denominations, such as Old Catholics, Mennonites, Reformed Anglican. The capital is Munich. Other important cities are Nuremberg, Augsburg, Würzburg, Fürth, Ratisbon, Bamberg, Bayreuth, Erlangen, Speyer, Schweinfurt.

History. The Celtic inhabitants of what now constitutes the southern part of Bavaria were



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conquered by the Romans about B.C. 15. The region was included partly in Vindelicia and partly in Noricum. The Romans founded the colonies of Augusta Vindelicorum, 'Augusta of the Vindelici' (now Augsburg), Regina Castra (Regensburg or Ratisbon), and Castra Batava (Passau). At the time of the great migration of nations the Marcomanni, moving westward from their seats in Bohemia (Boiohæmum, so named from the Celtic Boii, whom the Marcomanni had conquered about the beginning of the Christian Era), settled in Bavaria, which took its name from the new occupants, who were known as Boiarii (possessors of the country of the Boii). Dukes of the Bavarians appear in history as early as the Sixth Century. The bishoprics of Passau, Freising, and Ratisbon were founded in the Eighth Century. Before the close of that century Bavaria had been brought completely under the sway of the Franks. After the extinction of the Carlovingian dynasty, early in the Tenth Century, a new Duchy of Bavaria arose. In 1070 Bavaria passed into the possession of the Guelph (Welf) family. In 1180, when Henry the Lion was placed under the ban of the Empire by Frederick Barbarossa, his Bavarian territories were transferred to Otho, Count of Wittelsbach, whose descendant now occupies the royal throne. The Rhenish Palatinate was conferred on this family by the Emperor Frederick II. in 1214. Louis of Bavaria was Emperor of Germany in 1314-47. At this time the Palatinate was separated from Bavaria. (See PALATINATE.) Duke Maximilian, for his services to the Imperial cause in the Thirty Years' War (q.v.), was raised to the dignity of Imperial elector in 1623, and in 1628 was invested with the Upper Palatinate. In the War of the Spanish Succession Bavaria supported France. The Elector Charles Albert was one of the princes who sought to dismember the Austrian dominions on the accession of Maria Theresa. (See AUSTRIAN SUCCESSION, WAR OF THE.) He was elected Emperor of Germany in 1742, and died in 1745. In 1777 the Wittelsbach line in the Electorate of Bavaria became extinct, and the Wittelsbach line in the Rhine Palatinate succeeded to the throne. In 1805 Bavaria was erected into a kingdom by Napoleon I. The King assisted Napoleon in his wars, and received large additions of territory. In 1813, however, he cleverly contrived to change sides, and thus managed to have confirmed to him, by the treaties of 1814-15, an extent of territory nearly as valuable as the possessions which the treaties of Pressburg and Vienna had given him, and which he had now to restore to Austria.

In 1818 the new Constitution came into existence, but, owing to various causes, it did not secure the measure of popular freedom that had been expected. In 1825 Louis I. ascended the throne. He was a well-meaning and liberal monarch, but he lavished the wealth of the kingdom on the embellishment of the capital and on works of art, while he neglected works of practical value. The revolutionary wave of 1830 produced some disquiet in the country, but no serious disturbance. The Bavarian Government, however, took alarm, and restricted the freedom of the press; and, though the restrictions were speedily repealed, dissatisfaction was created by the imposition of new taxes. The Jesuits obtained great influence with the King, which they used to the detriment of popular rights. The people were further aroused by the King's relations with the notorious Lola Montez (q.v.), who was looked upon as an agent of the Ultramontanes. In March, 1848, following the example of the French revolutionists, the people of Munich seized the arsenal, and demanded reform and the expulsion of Lola Montez. The King had to consent, but in the same month he abdicated. His son, Maximilian II., ascended the throne. He died in 1864, and was succeeded by Louis II., a distinguished patron of Wagner, the great musician. After 1850 Bavaria showed itself hostile to the national movement toward German unity under the leadership of Prussia. In the war of 1866 it sided with Austria against the former power, suffered defeat, and was compelled to enter into an offensive and defensive alliance with the victor. Without abating in its dislike for Prussia, the country was forced by the power of national sentiment to join in the war against France. Circumstances thereafter made its entrance into the new German Empire inevitable. In June, 1886, Louis II., who had become insane, committed suicide. His brother assumed the title of Otho I.; but this prince being also mentally incapable of governing, the regency was taken over by an uncle, Prince Luitpold (born March 12, 1821).

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BA'VIAD, THE. The title of a work by William Gifford (1794), afterwards issued with *The Mæviad* (1797). It is in ridicule of a coterie of sentimentalists, self-styled Della Cruscans. The name is an adaptation of a minor Roman poet, Bavius, who, along with Mævius, regarded Horace and Vergil in much the same way that Pope was viewed by the hacks of Grub Street.

BAVIECA, bȧ-vyā'kȧ. The name given to the chief horse of the Cid. The story goes that his master, while yet a boy, picked out the animal, then a sorry-looking colt, from a number of much finer beasts, and was called by his father a dolt (*bavieca*) for the choice. This name was transferred to the horse.

BA'VIUS and **MÆ'VIUS**. Two Latin poetasters, who, otherwise unheard of, were made immortal bywords through their malevolence toward Horace and Vergil. Nothing further definite is authentically known of them, although they have unwarrantedly been credited with the *Antibucolica*, two pastoral parodies of the Vergilian *Eclogues*. By Vergil they are contemptuously dismissed with the well-known verse:

> "Qui Bavium non odit, amet tua carmina, Mævi."
> (Ecl. III., 90.)

Horace, however, in the Tenth Epode attacks Mævius in a tone of boisterous and half-burlesque exaggeration.

BAWBEE′, or **BABEE**. The popular designation of a half-penny in Scotland, now dropping out of use. The origin of the term is obscure, but it is most probably a corruption of the French *bas billon*, applicable to debased copper money. In the plural form the word is often popularly used in Scotland to signify money generally.

BAX′TER, James Phinney (1831—). An American historian, born at Gorham, Me. He became a prominent merchant and manufacturer in Portland, Me., of which city he was four times elected mayor. He was elected president of the Maine Historical Society, and in addition to various papers and monographs on the early history of America, has published: *The Trelawney Papers* (1884; Vol. III. of the *Documentary History of Maine*); *George Cleeve* (1885); *The British Invasion from the North* (1887); *Sir Ferdinando Gorges and His Province of Maine* (1890), and *The Pioneers of New France in New England* (1894).

BAXTER, Richard (1615-91). An English Nonconformist divine. He was born November 12, 1615, of poor but reputable parents, at Rowton, near Shrewsbury, in Shropshire. His early education was somewhat neglected. Instead of attending, as he wished, one of the universities, he was obliged to content himself with a course of private study, in the midst of which he was induced—singularly enough, for he was habitually serious—to try his fortune at Court in London (1633). Hither he accordingly went, fortified with an introduction to the master of the revels. A month sufficed to convince him that he was out of his element at Whitehall, and a protracted illness after his return helped to deepen the earnestness of his religious convictions. He studied theology, was ordained (1638), and entered on the mastership of the Dudley grammar school, from which he removed to act as assistant to a clergyman at Bridgnorth, where he resided nearly two years. In 1640 he was invited to become parish clergyman of Kidderminster, an offer which he accepted; and within a comparatively brief period not only did he establish his reputation as one of the most remarkable preachers of his time, but, what was better, succeeded in effecting a wonderful improvement in the manners of the people. On the breaking out of the Civil War his position became somewhat peculiar. Sincerely attached to monarchy, his religious sympathies were almost wholly with the Puritans, and, though a Presbyterian in principle, he was far from admitting the unlawfulness of episcopacy. These views, which, some time before the Restoration, became extremely popular, were now too catholic for the general taste, and the open respect shown by Baxter to some leading Puritans exposed him to danger from the mob. He therefore retired to Coventry, where he ministered for two years to the garrison and inhabitants. He afterwards accepted the office of chaplain to Colonel Whalley's regiment, and was even present at the sieges of Bridgewater, Exeter, Bristol, and Worcester. His influence was at all times exerted to modify the intolerance of partisanship, and to promote 'the spirit of love and of a sound mind.' On the urgent invitation of his parishioners he returned to Kidderminster, when ill health forced him to leave the army, and he continued to labor there for some time. During this period he greatly extended his fame by the publication of his *Saints' Rest* and *Call to the Unconverted*. He never dissembled his sentiments with regard to the execution of the King and the usurpation of Cromwell, even in the presence of the Protector himself, who endeavored, without success, to enlarge his ideas on the subject of revolutions. On the return of Charles, Baxter was appointed one of his chaplains (1660), and took a leading part in the conference held at the Savoy to attempt a reconciliation between the contending Church factions, a project defeated by the bigoted obstinacy of the bishops. Baxter was tempted with the offer of the See of Hereford, but declined the honor, praying instead to be permitted to return to his beloved flock at Kidderminster. He asked no salary, but his request was refused. The Act of Uniformity at length drove him out of the English Church, and in July, 1662, he retired to Acton, in Middlesex, where he spent the greater part of nine years, chiefly occupied in the composition of some of the most important of his numerous works. These he produced with a rapidity unparalleled in modern generations—at least in this one respect, that the quality was not always in the inverse ratio of the quantity. The Act of Indulgence in 1672 permitted him to return to London, where he divided his time between preaching and writing. At length, in 1685, he fell into the brutal clutches of Judge Jeffreys, who condemned him, for alleged 'sedition' in his *Paraphrase of the New Testament*, to pay a fine of 500 marks, and in default, to lie in the King's Bench Prison till it was paid. The circumstances of the trial are graphically described by Macaulay, in the second volume of his history. After a confinement of nearly 18 months Baxter was released and the fine remitted, on the mediation of Lord Powis. He lived after this to see better times, and preached frequently and to large congregations. He died in London on December 8, 1691.

Baxter is said to have preached more sermons, engaged in more controversies, and written more books than any other Nonconformist of his age; and Dr. Isaac Barrow has said of him that "his practical writings were never mended, and his controversial seldom confuted." The total number of his publications exceeded 160. Of these, by far the most popular and celebrated are his *Saints' Everlasting Rest* (London, 1650), only read now in an abridgment of an abridgment; *Dying Thoughts* (1683), and *Call to the Unconverted* (1657)— 20,000 copies of which last were sold in a twelvemonth, and it was translated into all European languages. More important, theologically are his *Methodus Theologiæ Christianæ* (1681) and *Catholic Theology* (1675), in which his peculiar system (see Baxterians—a compromise between Arminius and Calvin—is embodied. His autobiographical narrative is historically valuable; the review of his religious opinions is spoken of by Coleridge as one of the most remarkable pieces of writing in religious literature. His *Practical Works*, in 23 volumes, with a biography by Orme, were published (London, 1830), and reprinted in 2 volumes, with life, by L. Bacon (New Haven, 1844); also in 4 volumes, with an introductory essay by Rogers (London, 1868). For his biography, consult: J. Stalker (London, 1882); G. D. Boyle (London, 1883); J. H. Davies, *Baxter, Preacher and Prisoner* (London, 1887); W. Orme, *Life and Times of Richard Baxter* (London, 1830); and especially his autobiography, *Reliquiæ Baxterianæ*, edited by Sylvester (London, 1696).

BAXTER, Robert Dudley (1827-75). An English political economist, born at Doncaster, Yorkshire, and educated at Trinity College, Cambridge. He became a member of the Statistical Society of London in 1866, in which capacity he wrote the following valuable contributions to economic statistics: *Railway Extension and Its Results* (1866); *National Income of the United Kingdom* (1868); *Taxation of the United Kingdom* (1869); *National Debts of the Various States of the World* (1871); *Political Progress of the Working Classes* (1871).

BAXTE'RIANS. The term formerly applied to those who adhered to Baxter's theological system, the peculiar doctrines of which were: First, that though Christ died in a special sense for the elect, yet he also died in a general sense for all; second, the rejection of the dogma of reprobation; third, that it is possible even for saints to fall away from saving grace. The tendency of Baxter's views was toward a more liberal theology, but they are deficient in logical development. Like those of the 'New England Theology' (q.v.), they formed a mediating theology between what were considered the hard conclusions of Calvinism and the latitudinarian views of Arminianism. The two most eminent Baxterians were Dr. Isaac Watts and Dr. Philip Doddridge.

BAY (origin obscure; cf. LLat. *basia*, bay). A term properly applied to an indentation of the sea into the land, with an opening wider than the depth. A gulf is understood to be deeper than a bay, and has often a narrow opening. These terms are often loosely applied: Baffin's Bay, e.g. is really a gulf. When the body of water is large, and the entrance narrow, it becomes a shut sea, as the Baltic, the Red Sea, etc. Hudson's Bay, the Persian Gulf, and the Gulf of Mexico might with propriety be termed seas.

BAY (OF. and Fr. *baie*, berry, from Lat. *baca*, berry). A name given to a number of trees and shrubs more or less resembling the laurel or victor's laurel (*Laurus nobilis*), which is also called Sweet Bay (see Laurel), the name bay, which was once exclusively applied to the fruit, having been extended to the whole plant. The common laurel or cherry laurel (*Prunus laurocerasus*) is sometimes called Bay Laurel. (See Laurel.) The Red Bay of the Southern States of America is *Persea carolinensis*. The White Bay, or Sweet Bay of America, is *Magnolia glauca* (see Magnolia), and the Loblolly Bay of the same country is *Gordonia lasianthus*. (See Gordonia.) The California Bay-tree is *Umbellularia Californica*. Rose Bay is a name sometimes applied to some of the evergreen rhododendrons. From early times bay-leaves have been associated with popular superstitions and usages. Along with other evergreen, they have adorned houses and churches at Christmas; and in token of rejoicing or of some meritorious deed, sprigs of bay, as well as of laurel, have been worn in the hat, or wreathed around the head. The leaves of some kinds of bay are employed for flavoring various articles of food.

BAY (OF. *bayer*, to gape, from Med. Lat. *badare*, to gape). In architecture, one section in a structure, including a main opening. In the interior of a Gothic church, for instance, a bay is a single arcade of the nave, with the corresponding part of gallery and clerestory above it; a section of the church bounded by two imaginary vertical lines from roof to pavement, passing through the centre of the supporting piers. A church has as many bays as it has nave arcades.

BAYA, bä'yȧ (native name), or **BAYA SPAR'ROW.** An East Indian weaver-bird (*Ploceus Philipinus*), remarkable for its tubular hanging nest. In India and Malaya this bird is familiar about village houses, and is often kept in confinement, or even as a free pet, and is trained to do a variety of tricks, and especially to find small articles, steal ornaments from the hair, carry notes to certain places, etc. See Weaver Bird.

BAYAD, bȧ-yăd'. A large edible catfish (*Bagrus bayad*) of the Nile.

BAYADERE, bā'yȧ-dēr', or **BAYADEER** (from the Port. *bailadeira*, through the Fr. *bayadère*, danseuse, dancing girl; cf. It. *ballettare*, to dance, Engl. *ballet*). A name frequently used by Europeans to denote the dancing girls and singers of India. The title is especially applied to the women connected with the temples of Southern India as opposed to the Nautch girls of Northern India. As ministrants at the temples the Indian dancing women correspond in general to the ἱερόδουλοι, or *hierodūli*, the girls in attendance upon the shrine of Aphrodite, or Venus, at Corinth, in ancient Greece. In Southern India these dancing girls are known as *Deva-dāsīs*, servants or slaves of the gods, and their office is to minister to the particular divinity to whom the temple may be sacred; to serve him and his priests at sacred festivals and solemn processions; to celebrate his glories and to weave the wreaths with which his image is decorated; to dance and sing twice a day before his idol at the shrine; and generally to perform subordinate duties in the temple, without participating in the celebration of certain of the most sacred rites, and to serve the priests in various ways. Although these dancing women are the servants of the gods, the public is said to call them by the more vulgar name of courtesans or prostitutes, whether they be for the enjoyment of the idols, or the Brahmans, or the benefactors of the sanctuaries. Hence, no doubt, comes the bad association connected with the designation 'woman of the bayadere stripe.' The ranks of the better class of these female ministrants at the temple are recruited, it is said, from the Vaiśya, or merchant caste; the inferior class from the families of Sudras, or working people. No strong social prejudice, however, is felt against their calling. A small but fixed salary is paid to them for their services in connection with the temple, and this stipend they supplement, it is understood, in various ways peculiar to their person and their profession. They are often called in to perform at banquets, marriages, or at entertainments of the rich or the noble. Dancing in India is still confined to these professional girls, and is not considered respectable, although with the advance of female education women are now more generally taught to sing as well as to read. The special patroness or protectress of the Devadāsīs is the goddess Rambhā, who belongs to the band of Apsarases, or heavenly nymphs, of Indra's paradise. Consult Dubois, *Hindu Manners, Customs, and Ceremonies* (Oxford, 1897); and see Dancing Girl, Nautch.

BAYAMO, bá-yä'mō. A town in the Province of Santiago, Cuba, 60 miles northwest of the city of Santiago (Map: Cuba, J 6). It is situated in a plain on the Rio Bayamo, an affluent of the Cauto, and is an agricultural and commercial centre, though formerly its importance was much greater. One of the oldest cities on the island, Bayamo, was founded in 1514 by Velasquez. It was prominent in the war of 1868-78, and during the last insurrection was one of the strongholds of the insurgents. Population, in 1899, 3022.

BAYARD, bā'ẽrd, *Fr. pron.* bá'yär'. The horse of the four sons of Aymar, famous for his swiftness and for his power of adjusting the length of his body to one or several riders. He appears in *Orlando Innamorato, Orlando Furioso*, and Tasso's *Rinaldo*. The name 'Bayard' is used to designate any spirited or fine horse.

BAYARD, bī'ẽrd, George Dashiell (1835-62). An American soldier, born at Seneca Falls, N. Y. He graduated at West Point in 1856, and passed four years in garrison duty on the frontier. At the outbreak of the Civil War he was appointed colonel of the First Pennsylvania Cavalry Volunteers. He was soon promoted to be brigadier-general, served in the campaigns of the Shenandoah and the Rappahannock, and was mortally wounded at Fredericksburg (December 13, 1862).

BAYARD, James Asheton (1767-1815). An American statesman, born in Philadelphia, Pa. He was graduated in 1784 at Princeton, began the practice of law in Delaware, and in 1796 was elected to the national House of Representatives, where he achieved a high reputation as an orator and a leader of the Federalists. When, after the indecisive Presidential contest of 1800 between Jefferson and Burr, the duty of election devolved upon the House, Bayard was prominent in securing the choice of the former. From 1805 to 1813 he was a United States Senator. He declined the ministry to France in 1801, and that to Russia in 1814. In the latter year he was a member of the commission which negotiated with Great Britain the Treaty of Ghent.

BAYARD, James Asheton (1799-1880). An American lawyer and legislator, son of James Asheton Bayard. He was born in Wilmington, Del., studied law, and attained considerable eminence at the bar. He served in the United States Senate as a Democrat during the years 1851-64 and 1867-69, for a considerable part of which time he was chairman of the judiciary committee.

BAYARD, bá'yär', Jean François Alfred (1796-1853). A French dramatist. He was born at Charolles, Saône-et-Loire, and studied law, but in 1828 turned to dramatic composition. In collaboration with Scribe and others he wrote more than 200 plays, including *La perle des maris* and *Le gamin de Paris*. His collected works appeared in 12 vols. (1855-59).

BAYARD, bī'ẽrd, John (1738-1807). An American patriot, born at Bohemia Manor, Md. He became a prominent merchant of Philadelphia, was a member of the provincial congresses of 1774 and 1775: in 1776 was appointed by the Constitutional Convention a member of the Council of Safety, and in 1776-77 served in the American Army as colonel of infantry. He was Speaker of the Pennsylvania House of Assembly in 1777 and 1778, and was elected in 1785 to the Continental Congress. During the Revolution he assisted in furnishing arms to Congress, and in fitting out a privateer.

BAYARD, bá'yär', Pierre du Terrail (1476-1524). A French knight, the *chevalier sans peur et sans reproche*, without a rival the model of chivalric virtue, and one of the few mediæval knights whose virtues can stand the tests of modern culture. Though his activity was chiefly military, he cultivated all the gentler virtues, yet was equaled by none in courage and intrepidity. Three French kings profited by his loyal devotion—Charles VIII., Louis XII., and Francis I. Italians, Spaniards, and Englishmen on innumerable occasions suffered by his remarkable exploits, but they honored as much as they feared him. At the Garigliano (1503), Bayard defended the bridge alone, against a whole detachment of the victorious army of Gonsalvo de Cordova. At Guinegate, in the 'Battle of the Spurs' (1513) he performed an equal feat of valor. At Marignano (1515), Bayard gained a brilliant victory over the Swiss auxiliaries of the Duke of Milan. Upon the battle-field, his elated King (Francis I.) bowed to receive knighthood from the hero of this 'Battle of the Giants.' In 1521 Bayard defended Mézières against Charles V., prevented an invasion which France could hardly have resisted, and on his return to Paris was hailed as the savior of his country. He was given command, in his own name, of a company of 100 knights—an honor usually accorded only to princes of the blood royal. He fell in the battle of the Sesia, April 30, 1524. While dying he fell into the hands of the Spaniards, among whom was the Constable of Bourbon, his last utterance to whom has become famous: "My lord, I thank you: but pity is not for me, who die a true man, serving my King; pity is for you, who bear arms against your prince, your country, and your oath." The Spanish vied with the French in the honors paid to his remains and his memory. His life was written soon after by Symphorien Champier, his 'loyal servant.' Consult Saint Alban, Berville, and others, *Le Chevalier Bayard*, trans. and ed. by E. Walford (London, 1867).

BAYARD, bī'ẽrd, Thomas Francis (1828-98). An American statesman and diplomatist. He was born on October 9, 1828, in Wilmington, Del., attended a private school in Flushing, L. I., and for some time was a clerk in a New York commercial house, but returned to Wilmington (1848), studied law with his father (J. A. Bayard), and was admitted to the bar in 1851. In 1861 both he and his father, though strongly opposed to secession, were also opposed to coercion, and publicly denounced the war, in which neither took any part. In 1869 he succeeded his father as United States Senator, being the fifth member of the family to represent Delaware in this capacity, and served continuously until 1885, when he became Secretary of State under President Cleveland. In the Senate he took a leading position on the Democratic side; he was a member of the Electoral Commission in 1877, and was president *pro tem.* of the Senate in 1881. His name was often urged for the Presidency, and in the Democratic national conventions of 1880 and 1884 he was the chief rival of the successful candidates. As Secretary of State he was called upon to deal with several important matters, such as the Bering Sea controversy and the British and Russian treaties. From 1893 to 1897 he was United States Ambassador to Great Britain, being the first to hold that diplomatic rank. He received the degree of LL.D. from Harvard, and that of D.C.L. from both Oxford and Cambridge. Consult Edward Spencer, *Public Life and Services of Thomas F. Bayard* (New York, 1880).

BAYAZID I. See BAJAZET.

BAYBAY, bäī′bäī. A town of Leyte, Philippines, situated 87 miles from Tacloban, the capital of the province. Population, in 1898, 17,367.

BAY′BER′RY. See CANDLEBERRY.

BAY CIT′Y. A city and county-seat of Bay County, Mich., on the Saginaw River, at the head of navigation, 4 miles from Saginaw Bay, and on the Michigan Central, the Père Marquette, and other railroads (Map: Michigan, K 5). It is connected also by boat with other lake ports. Several bridges cross the river at this point, and the city contains parks, a public library, and a fine city hall. It has a very extensive trade in lumber and salt, and exports also beet-sugar, coal, machinery, etc. There are other manufactures of importance. Settled in 1836, Bay City was incorporated as a village in 1859, and in 1865 was chartered as a city. Under the revised charter (1899), the government is vested in a mayor, elected biennially, and a council. With the consent of the council, the mayor appoints the administrative boards; the council elects the city engineer, street commissioner, and city attorney. The water-works and electric-light plant are the property of the municipality. In 1903 the Legislature passed an act, to take effect April 1, 1905, consolidating Bay City and West Bay City (q.v.). Population, 1890, 27,839; 1900, 27,628.

BAYER, bī′ẽr, JOHANN (1572-1660). A German astronomer. He was a zealous Protestant pastor and obtained the cognomen *Os Protestantium* (the Mouth of Protestants). He is now remembered chiefly for his *Uranometria* (1603), in which he gave 51 maps of the heavens, constructed from the observations of his predecessors, and followed by explanations in his *Explicatio Caracterum Æneis Tabulis Insculptorum* (1654). He introduced in his maps the plan of distinguishing the stars of a constellation by means of Greek and Latin characters designating the largest star of the constellation by the first letter of the alphabet, and the rest in order of their apparent brilliancy by the succeeding letters.

BAYER, KARL ROBERT EMMERICH (1834-1902). An Austrian novelist, whose pseudonym was Robert Byr; born at Bregenz and educated at the military academy of Wiener-Neustadt. He served as an officer of the General Staff in the Italian campaign of 1859, but resigned from the military service in 1862, and thenceforth devoted himself exclusively to the writing of fiction. Among his best productions are the following: *Der Kampf ums Dasein* (1872); *Gita* (1877); *Eine geheime Depesche* (1880); *Unversöhnlich* (1882); *Lydia* (1885); *Der Weg zum Glück* (1890); *Sternschnuppen* (1897).

BAYES, bāz. A caricature of Dryden in Buckingham's play, *The Rehearsal.* The character is a would-be literary man, and was at first meant to satirize Sir Robert Howard. The drama abounds in ridiculous situations, and the laureate's mannerisms are excellently shown.

BAYEUX, bȧ′yẽ′ (city of the Baiocasses; *Baioca* in the Middle Ages). An episcopal city of France, in the Department of Calvados, Normandy. It stands in the fertile valley of the Aure, about 5 miles above its outlet in the English Channel (Map: France, F 2). This ancient, badly built town has a fine cathedral; its splendid portal and three towers are conspicuous features of the place. The public institutions are a seminary, a communal college, a museum and library of 25,000 volumes, whose most curious historic relic is the famous tapestry by Matilda, Queen of William the Conqueror, which depicts the invasion of England. The industries of Bayeux comprise porcelain, lace, bonnet-making, and cotton-spinning. There is also a brisk trade in fatted cattle, honey, butter, grain, etc. Population, in 1896, 7900. Bayeux occupies the site of that Roman Augustodurum which took the place of the ancient capital of the Gallic Baiocasses. The position exposed it to all the storms which swept over France from the conquest of Rollo to the great Revolution, during which it remained loyal to the Bourbons. Consult: Masselin, *Le diocèse de Bayeux du Ier au XIème siècle* (Caen, 1898); Hepworth, "Bayeux," in *The Artist*, No. XXIII. (New York, 1898).

BAYEUX TAP′ESTRY. The most remarkable and extensive remaining specimen of early mediæval embroidery (q.v.). It is a web of white canvas or linen cloth, 214 feet long by 20 inches wide, preserved in the public library at Bayeux, France (Normandy). Upon it is embroidered, in woolen thread of various colors, a representation of the invasion and conquest of England by the Normans in 1066. Tradition asserts it to be the work of Matilda, wife of William the Conqueror. It belonged to the Cathedral of Bayeux, where it was used as a decorative hanging on feast-days. It contains 1512 figures in 72 subjects, with Latin inscriptions giving the subjects and names. The heads and hands of the figures are crudely designed in 'plumetis'; the rest is formed of parallel lines of woolen threads fastened down at intervals. A thread of a different shade gives the outlines. The border is of foliage, fantastic animals, and hunting scenes. The tapestry is most valuable for a representation of the costume, arms, and manners of the Normans before the Conquest, and does for this period what the columns of Trajan and Marcus Aurelius do for Roman military life of their age; giving also, as they do, more details of the events represented than are given in contemporary literature. It is, in fact, more than a history of the Conquest; for it gives the life of Harold, even during the lifetime of Edward the Confessor, the incidents of his journey to Normandy, his return and coronation, the Norman expedition, the battle of Hastings, and Harold's death.

BAY IS′LANDS. A group of small islands in the Atlantic, situated off the northern coast of Honduras, Central America. It consists of the islands of Ruatan, Bonacca or Guanaja, Utila, Barbareta, and a few others, and constitutes the Department of Islas de la Bahía. The islands are somewhat mountainous, but the valleys are very fertile. The population is estimated at nearly 3000, including over 500 Indians. The group was taken by England in 1852 and returned to Honduras in 1859.

BAY LAGOON′. A navigable fresh-water lake in the southern part of Luzon, Philippines, about 45 miles long and 15 miles wide in its broadest part. It has the island of Talim near its centre, and on its shores are a number of important towns, chief of which are Morong and Santa Cruz. It is connected with Manila Bay on the west by the Pasig River, about 10 miles long.

BAY LAU′REL. See CHERRY LAUREL.

BAYLE, bâl, PIERRE (1647-1706). A French philosopher and critic. He was the author of a famous *Historical and Critical Dictionary* (*Dictionnaire historique et critique*), which passed through eight editions in 40 years (1697, 1702, 1715, 1720, 1730, 1734, 1738, 1740), and was twice translated into English (1709, 1734-41). He was born at Carla, near Foix, November 18, 1647, of a Protestant family, studied at Puy-Laurens and Toulouse, and showed the critical balance of his mind by professing Catholicism in 1669 and Protestantism in 1670. He taught for a time in Geneva, and in 1675 became professor of philosophy at the Protestant Academy of Sedan. On its suppression (1681) Bayle sought intellectual freedom in Holland, and settled at Rotterdam, where he received a salary from the municipality as an unattached professor of philosophy. He now published his first important work, the sensational *Pensées sur la comète*, and a *Critique générale sur l'histoire du Calvinisme du Père Maimbourg* (1682), somewhat antiquated in style, but in thought a full generation in advance of his countrymen. In 1684 he began to publish a literary magazine, *Nouvelles de la république des lettres*, and greeted the revocation of the Edict of Nantes by two pamphlets, *Ce que c'est que la France toute catholique sous le règne de Louis le Grand*, and *Commentaire philosophique sur le Compelle Intrare* (1686), which were denounced for 'preaching the dogma of religious indifference and universal toleration,' alike by Protestants and by Catholics, and was disavowed ironically by Bayle, who had the courage of his convictions, but not of their consequences. Such tactics, afterwards imitated by Voltaire, make his authorship of *Avis aux réfugiés* (1690) dubious; but in any case it intensified the opposition of Protestants, who now accused him of atheism, with the result that Bayle was deprived (1693) of his municipal pension and authority to teach in Rotterdam. This act he chose to attribute to his Cartesian philosophy, the ministers being, he said, 'obstinate admirers of Aristotle.'

Bayle now devoted himself wholly to compiling his Dictionary, originally as a work of pure erudition, to trace and rectify error in other works, but it became in the course of its compilation a destructive criticism of received history and systems, and so an arsenal of rationalism for the Eighteenth Century. The Dictionary makes no pretense to completeness, but it acquires a kind of unity through its constant insinuation that the teachings of reason contradict the dogmas of religion, and that the rational man, in forming his morality, will consider only himself. In the articles of the Dictionary, and still more in the notes to them, Bayle's humor delights in daring impieties and Rabelaisian obscenities, after the manner of his time, possibly as a mask for his insidious dialectic. It popularized his work, but gave a handle to his enemies, who grew in number and virulence. To justify himself, he wrote four dissertations—*On Atheists; On Manichæans; On Obscenities;* and *On Pyrrhonists;* but his last work—*Réponse aux questions d'un provincial* (1703) and *Continuation des pensées sur la comète* (1704)—showed that he still thought it, in his own words, "in no wise sure that the impressions of nature are to be accepted as the expressions of truth." He died at Rotterdam, December 28, 1706. Bayle's private life was dignified and disinterested. His libertinism was wholly intellectual. His ideas and spirit penetrate like yeast the whole Eighteenth Century. Bayle's *Works* (4 folios, 1727-31, reprinted with additions, 1737) contains his interesting *Correspondance*. There is a commentated edition of the *Dictionnaire* in 16 vols. (Paris, 1820), and a *Selection of Unpublished Correspondence* (*Choix de la correspondance inédité*, Copenhagen, 1890). The *Dictionnaire* was translated (4 vols., 1710; 3d ed., 5 vols., 1734-38). Consult: Desmaizeaux, *La vie de Pierre Bayle* (The Hague, 1732); and Feuerbach, *Pierre Bayle* (Leipzig, 1848). See also Brunetière, *Etudes critiques*, 5th series (1893); Renouvier, *Philosophie analytique de l'histoire*, Vol. III. (1897); and Perrens, *Les libertins en France au XVII. siècle* (1896).

BAYLEN, bī-län′. See BAILÉN.

BAYLEY, bā′lĭ, JAMES ROOSEVELT (1814-77). An American prelate of the Roman Catholic Church. He was born in New York, graduated at Washington (now Trinity) College, Hartford; was ordained a Protestant Episcopal clergyman, and for some time preached in New York. In 1842 he became a Roman Catholic, and two years later was ordained by Bishop Hughes. He served for a time as professor of belles-lettres and acting president of Saint John's College, Fordham, N. Y., and was secretary to Bishop Hughes from 1846 to 1853, where he was consecrated Bishop of Newark, N. J. He founded Seton Hall College, and many other institutions. In 1872 he was made Archbishop of Baltimore. He published a *History of the Roman Catholic Church on the Island of New York* (1853); *Pastorals for the People*, and the *Memoirs of Simon Gabriel Brute, First Bishop of Vincennes* (1860). He was much esteemed for his social as well as for his intellectual gifts.

BAYLEY, RICHARD (1745-1801). An American physician. He was born in Fairfield, Conn., studied in London hospitals, began to practice in New York in 1772, and in 1775-76 studied in

England with Dr. John Hunter. Early in 1776 he returned to the United States as staff surgeon to Sir Guy Carleton. He lectured on surgery, and published a work on croup, introducing a new and valuable method of treating that disease. In 1792 he became professor of anatomy and surgery in Columbia College. He was the first health officer of the port of New York, and as such originated New York's quarantine laws.

BAY′LISS, Sir Wyke (1835—). An English artist. He was born at Madeley, and received his art education at the Royal Academy. He is known almost entirely through his fine interiors of cathedrals and churches, frequently exhibited in America, of which the most famous are: "La Sainte Chapelle" (Royal Academy, 1865); "Saint Mark's, Venice" (Nottingham, 1880); "Saint Peter's, Rome" (1888); "The Golden Duomo" (Pisa, 1892). He became president of the Royal Society of British Artists in 1888. His publications include: *The Witness of Art* (1876); *The Higher Life in Art* (1879); *The Elements of Aërial Perspective* (1855); and he edited Thomas Heaphy's *Likeness of Christ* (1881).

BAY′LOR, Frances Courtenay (1848—). An American novelist, born at Fayetteville, Ark. Being of Virginian parentage, she has resided chiefly at Winchester, Va., and since her marriage to Mr. G. S. Barnum at Savannah, Ga. She first attracted attention by two short stories, *The Perfect Treasure* and *On This Side*, published together under the title *On Both Sides* (1886). Among her other novels are *Claudia Hyde* (1894) and *The Ladder of Fortune* (1899). *Juan and Juanita* (1897) is juvenile.

BAYLOR, Robert Emmet Bledsoe (1793-1874). An American jurist, born in Lincoln County, Kentucky. After serving in the War of 1812, he began the practice of law in Kentucky, but afterwards removed to Alabama; was a member of Congress from that State from 1829 to 1831, and participated in the Creek War as commander of a volunteer regiment. He afterwards removed to Texas, where he became one of the foremost advocates of the annexation of that republic to the United States, and was a member of the First Constitutional Convention. He subsequently served as a district judge for twenty-five years. A Baptist college, chartered in 1845 by the Congress of Texas, received the name of Baylor University, in recognition of the liberal donation bestowed upon it by Judge Baylor.

BAYLOR U′NIVER′SITY. A Baptist educational institution. It was chartered in 1845, and was formerly situated at Independence, Tex., but removed in 1882 to Waco, in the same State. Its endowment in 1901 was $350,000, and its library contained 10,000 volumes. At the same time the faculty numbered 39, and the students 747, including preparatory pupils.

BAYLY, bā′lĭ, Ada Ellen. See Lyall, Edna.

BAYLY, Lewis (—?1631). Bishop of Bangor, Wales. He was a native Welshman: was educated at Oxford, and enjoyed favor at Court, but later lost it because of his Puritan sympathies. He is now remembered only as the author of the *Practice of Piety*, the most popular religious book until Bunyan's work appeared. Besides numerous editions of the original work, translations appeared in Welsh, French, German, Polish, and Romansch. John Eliot translated it into the Indian language as an aid in his mission work. Bunyan attributed his first religious awakening to the reading of this book.

BAYLY, Thomas Haynes (1797-1839). An English poet. He was intended for holy orders, and educated at Oxford; he inherited a large fortune, but lost it, and in 1831 began to write songs for music, and, with Henry Bishop, published *Melodies of Various Nations*. Within a few years he wrote thirty-six dramatic pieces, a number of stories, and hundreds of songs. Some of the more popular were: "The Soldier's Tear;" "Why Don't the Men Propose?" "We Met, 'Twas in a Crowd;" "I'd Be a Butterfly," etc. His best farce is *Perfection*. His fiction is represented by *The Aylmers*, a novel in 3 vols., and *Kindness in Women*, a collection of tales. Consult his *Works*, with memoir (London, 1844).

BAYNE, bān, Peter (1830-96). A Scottish author. He was educated in Marischal College, Aberdeen; studied theology at Edinburgh, and philosophy under Sir William Hamilton. He wrote criticisms on Alison, De Quincey, Hugh Miller, and others. In 1855 he published *The Christian Life, Social and Individual*, which was followed in 1859 by *Essays Biographical, Critical*, etc. He was editor of the Glasgow *Commonwealth*, Edinburgh *Witness*, and London *Dial*, and an associate editor of the *Christian World*. Among his other works are *Testimony of Christ to Christianity* (1862); *The Days of Jezebel* (1872); a historical drama; and *Life of Luther* (1887). He died in London, February 10, 1896.

BAYNES, bānz, Thomas Spencer (1823-87). An English writer on philosophy. He was born at Wellington, England; was educated at Bristol College and Edinburgh University and became assistant to Sir William Hamilton at the latter institution. He published an *Essay on the New Analysis of Logical Forms* (1852), an exposition of Hamilton's *Qualification of the Predicate*. From 1857 to 1863 he was one of the examiners for the University of London, and assistant editor of the *Daily News*. In 1864 he became professor of logic, rhetoric, and metaphysics in the University of Saint Andrews, where he remained till his death. He wrote much for the *Edinburgh* and other reviews and magazines, and was editor of the ninth edition of the *Encyclopædia Britannica*.

BAY OF IS′LANDS. (1) A bay on the northeast coast of North Island, New Zealand, in latitude 35° 14′ S., longitude 174° 11′ E. (Map: New Zealand, E 1). (2) A bay on the western coast of Newfoundland, studded with many beautiful islands, with fisheries, timber, and deposits of marble and gypsum (Map: Newfoundland, B 3).

BAYOMBONG, bī′yŏm-bông′. The capital of the Province of Nueva Vizcaya, on the Island of Luzon, Philippines (Map: Philippine Islands, F 3). The town is situated on the Magat River. 166 miles north of Manila, and is the centre of a fertile district, producing rice and tobacco. Population, 3691.

BAY′ONET (Fr. *baïonnette, bayonnette*, first made in Bayonne, France). A short, dagger-like weapon of steel, constructed so that it may be fixed at the end of the rifle-barrel, to which it is attached by a strong spring-clasp, usually secured to the block of the foresight. When not so fixed it is carried in a leather scabbard suspended from the waist-belt on the left side of the body. The first bayonets, used in France in 1671, were known as *bayonets-à-manche*, and had handles which fitted into the muzzles of the guns; the socket bayonets, or *bayonets-à-douille*, not being introduced until a later date. These latter permitted the piece to be fired without removing the bayonet. The dagger is said to have been the original bayonet; the musketeer of that day having utilized his dagger as a defense against charging cavalry by fitting the handle of his dagger into the muzzle of his musket. During the gradual evolution of the modern sword-bayonet, which is now a weapon of offense rather than of defense, many experiments have been made, in the attempt to introduce various forms of intrenching tools—knives, etc., constructed to serve also as bayonet; but such arrangements are nowhere in general use. The rammers or wiping-rods of the 45-calibre Springfield rifle, still used by many of the State national guards in the United States, have been sharpened at one end and utilized as bayonets. Many authorities maintain that the bayonet, together with all other forms of the *arme blanche*, have become of very little — if comparatively any — importance in modern operations; while others, equally as positive, assert that it still retains decisive value. It is certainly true that long-range and rapid-fire rifles, together with smokeless powder, often seal the fate of a battle long before the bayonet can be brought into play; but there are still campaigns where the soldier armed with the bayonet has a considerable moral superiority over his opponent not so armed. The British-Egyptian campaigns of 1882-84 and 1886, the frontier expeditions in India, and the Boer War of 1899-1902 are cases in point. The best tactician in the world cannot always prevent, even with modern firearms, such things as surprises; and small bodies of men will still occasionally, under practically any conditions, be able to get unperceived into close quarters with their enemy. So long as night attacks are possible, just so long will the bayonet be of prime importance, for it is undoubtedly and invariably the weapon to be used. See TACTICS, MILITARY; and INFANTRY.

BAYONNE, bȧ-yŏn′, *Fr. pron.* bâ′yōn′ (Bay city, from Bisc. *baia*, *baiya*, harbor, Portug. *bahia*, Engl. *bay*). A cathedral town, and a fortress of the first class, in the Department of the Basses-Pyrénées, France (Map: France, E 8). It stands 3½ miles from the Bay of Biscay, at the confluence of the Nive and Adour, which rivers divide the city into Great and Little Bayonne, with which the Faubourg Saint-Esprit is connected by a bridge. The city is cheerful and pleasant, and the valley in which it lies is backed by the foothills of the Pyrenees. The harbor of Bayonne is safe and commodious, and has three lighthouses at its entrance. The public institutions consist of a library of over 10,000 volumes, a theological seminary, and a naval school. The cathedral was begun in 1213, and its corbels bear the arms of English princes of the occupation period. The spires are modern (Nineteenth Century). Bayonne has an extensive trade with Spain, Portugal, and South America, and sends masts and ship-timber to Brest and other French ports. Its exports are wine and chocolate and the famous Bayonne hams. Its industries comprise the making of brandy, cream of tartar, leather, linen goods, and the refining of sugar. Glass-houses, anchor foundries, and shipyards are also in active operation at Bayonne. Population, in 1896, 22,200. Bayonne is the ancient Lapurdum, the capital of the Tarbelli, and as early as the Third Century A.D. was a fortress and a commercial centre.

BAYONNE, bȧ-yŏn′. A city in Hudson County, N. J., on New York and Newark bays, and on the New Jersey Central Railroad (Map: New Jersey, D 2). It contains the former villages of Centerville, Bergen Point, Bayonne, and Salterville (Pamrapo). The city has a public library of over 10,300 volumes. Bayonne is one of the most important manufacturing cities in the State, and contains—in addition to large coal-shipping docks, color-works, chemical-works, boiler-works, copper-refining and nickel-smelting works, and electric launch, insulated wire, and silk factories—the largest plant of the Standard Oil Company, the refineries of which are connected by pipe-lines with New York, Philadelphia, Baltimore, Pittsburg, and other cities. The Hudson County Boulevard passes through the city. Bayonne was separated from Bergen as a township in 1861, was chartered as a city in 1869, and rechartered in 1872. The executive power is exercised by a mayor, elected for two years, who appoints the board of health and library trustees, and, with the concurrence of the city council, the police department and sinking-fund commissioners. All other municipal officials are elected by the people. Population, in 1890, 19,033; in 1900, 32,722.

BAYONNE DECREE′. A decree issued by Napoleon on April 17, 1808, under pretense of helping the United States to enforce the embargo of 1807, directing the seizure and sale of all vessels flying the American flag which should subsequently enter the ports of France, Spain, Italy, and the Hanse towns, on the ground that such vessels would either be sailing under false colors or would be violating the laws of the United States and indirectly serving the cause of England. In accordance with this decree it is estimated that France confiscated over 300 American vessels, which she sold for the benefit of her national treasury. See article on the CONTINENTAL SYSTEM.

BAYOU, bī′o͞o (N. Am. Indian *bayuk*). A stream not fed with springs, but running from one body of water to another, like a canal. Tidal channels in the States on the Gulf of Mexico often have the name.

BAYOU STATE. The name popularly given to the State of Mississippi, from the number of small creeks or bayous within its limits. See STATES, POPULAR NAMES OF.

BAY PSALM-BOOK. The first book published in the American Colonies, the joint product of Richard Mather, founder of that distinguished family of New England divines, of Thomas Welde, and of John Eliot, the missionary to the Indians. It was printed by Stephen Daye, at Cambridge, in 1640, and after revision in 1650 remained in general use for many years. It is hard to realize how it can have ministered to edification, for it outdid Sternhold and Hopkins in harsh erudity of style, metre, and rhythm. Yet it was the product of university men. Mather had been a student at Oxford; John Eliot was a graduate of Cambridge. They must have served their apprenticeship there at Latin verse-making, and it is incredible that they should not have been able to write better English verse. But they were determined that the Lord's praises should be sung according to His own will, and with their ideas of literal biblical inspiration they were willing to sacrifice every element of poetry to what they imagined was faithfulness to Hebrew originals. They tell us in their preface that they "attempted conciseness rather than elegance, fidelity rather than poetry." That they thought these qualities contradictory illustrates the fatal flaw in Puritan æsthetics. How numbing this moral discipline had been to the harmonies and amenities of life may be judged from the fact that few congregations knew more than five tunes, and but ten are known to have been used in the first half-century of the *Bay Psalm-Book's* existence.

BAYREUTH, bī'roit (Lat. *Baruthum*). The capital of the Government district of Upper Franconia, Bavaria, formerly the capital of the principality of the same name, ruled by Margraves of the House of Hohenzollern (Map: Germany, D 4). It is called the Mecca of the Wagnerites, on account of the Wagner Theatre, built especially for the performance of his operas, which attracts visitors from all over the world. Bayreuth is beautifully situated on the Red Main, 126 miles north of Munich. Its streets are broad and well paved. Its principal buildings are the old palace; the new palace, containing a gallery of paintings; the old opera-house; riding-school; infirmary and town-hall. The Richard Wagner Festival Theatre, erected in 1875, on a hill overlooking the town, is reached by a broad avenue of shady trees. Among the interesting private houses are the Villa Wahnfried, the former residence of Richard Wagner, who is buried in its grounds, and the house of Jean Paul Richter. In the Central Cemetery are the graves of Jean Paul Richter and the composer Franz Liszt. Bayreuth has numerous educational and charitable institutions. There are manufactures of cotton goods, sewing-machines, and agricultural and musical instruments. There are also breweries, distilleries, and brick-kilns. Population, in 1890, 25,000; in 1900, 29,000. Consult: Meyer, *Das Stadtbuch von Baireuth* (München, 1896); Jones, "Bayreuth and the Wagner Festival," in *Cassel's Magazine*, Vol. XXVII. (London, 1899).

BAYREUTH MUSICAL FESTIVAL. The Festival Theatre of Bayreuth has been described as the musical shrine of Richard Wagner. The city itself is the capital of the district of Upper Franconia, Bavaria, and is situated on the Red Main. The building of the Festival Theatre had been the dream of Wagner's life, and eventually he was fortunate enough to secure the interest of the unhappy King Louis II., of Bavaria, from whom and through whom he secured much financial assistance, which, with the subscriptions received from lovers of his music, enabled him to carry out his long-cherished scheme. The idea was first conceived in 1858, and the *Tetralogy of the Nibelungen* written, composed, and reserved until there should have been materialized the conditions and environments which its creator deemed necessary for its proper presentation. The situation of the theatre has been admirably chosen, with the town of Bayreuth in the foreground, and the hills of Franconia for a background. Performances begin at 4 P.M. except when the *Rheingold* is given, when the hour is altered to 5 P.M. The artists, who invariably give their services, carry out as far as possible Wagner's directions and ideas. They never recognize the plaudits of the audience, and as far as possible discourage ebullitions of feeling on the part of their auditors. Originally, the audience remained silent throughout every performance; but this rule is now seldom obeyed except in the solitary instance of *Parsifal*. In order to secure every possible artistic reinforcement, the singer is sometimes reduced to become almost the mere agent of the literary expression: the orchestra is hidden away out of sight under the stage; and the auditorium itself is plunged into darkness before and during each act. On May 22, 1872, the foundation-stone was laid, the event being marked by the performance of Beethoven's *Ninth Symphony*, with an orchestra of 500 instruments, comprising many of the greatest instrumentalists of the day, among whom were Wilhelmj (q.v.), playing a first-violin part, and Hans Richter, with the tympani. The theatre was opened in 1876 with the *Nibelung*, the festival continuing from August 13th to August 17th. The next festival occurred in 1882, when *Parsifal* had its first presentation; since which event performances have been given almost every year. The festival of 1897 was especially remarkable as being the first time five complete works were given, the *Tetralogy* and *Parsifal*. To Frau Wagner and Siegfried Wagner, wife and son of the master, is mainly due the credit of maintaining intact, as far as possible, the traditions of the Bayreuth Festival. See MUSIC FESTIVAL.

BAYRHOFFER, bīr'hôf'fẽr, KARL THEODOR (1812-88). A German-American philosopher and publicist, from 1838 to 1846 professor of philosophy in the University of Marburg. He became a member of the Diet of Hesse-Cassel in 1848, and in 1850 was president of the Chamber. After the defeat of his party (the Democratic) he came to America in 1853 and settled in Wisconsin as a farmer, though from 1866 he lived principally by his pen. In his early writings, notably in *Idea and History of Philosophy* (1838), he appears as a zealous disciple of Hegel. Afterwards he became a champion of German Catholicism, and wrote *Researches into the Essence, History, and Criticism of Religion* (1849).

BAY RUM. An aromatic liquid prepared by mixing oil of bay with alcohol and water, and adding small quantities of oil of orange peel and oil of pimenta. Oil of bay is obtained by distilling the leaves of the *Myrcia acris*, a West Indian tree belonging to the natural order *Myrtaceæ*.

BAY SAINT LOU'IS, *Fr. Creole pron.* bā săN lōō'ē'. A city and county-seat of Hancock County, Miss., 51 miles east by north of New Orleans, La.; on Mississippi Sound, and on the Louisville and Nashville Railroad (Map: Mississippi, G 10). It is a popular watering-place, a notable attraction being a fine shell road along the beach. The leading industries are fishing, oyster cultivation, and canning, fruit-growing, and truck-gardening. Population, in 1890, 1974; in 1900, 2872.

BAY SALT. A name applied to common salt which is obtained from sea-water by solar evaporation. Such salt is obtained from salt marshes which exist along the coast of France, on the shores of the Mediterranean, and along San Francisco Bay, in California.

BAY STATE. A popular name for the State of Massachusetts, because previous to the adoption of the Federal Constitution it was called the Massachusetts Bay Colony. See STATES, POPULAR NAMES OF.

BAY WIN'DOW, or (corruptly) **BOW WINDOW.** A window first generally used in late civil Gothic architecture, so called because it forms a bay (q.v.) or projecting section of a room. The external walls of bay windows are, for the most part, either rectangular or polygonal, the semicircular form from which the term *bow* was probably derived having been unknown before the latest form of Gothic. Bay windows generally reach to the floor, and are frequently supplied with a seat, which is called the 'bay-stall.' There are many very beautiful examples in the colleges and halls of Oxford and Cambridge, as well as in the great feudal mansions. When used in upper stories, such windows are supported on corbels, or large projecting moldings. See ORIEL WINDOW.

BAZA, bä'thȧ (the *Basti* of the Romans). A town in Spain, situated near the River Baza, in the Province of Granada, about 50 miles east-northeast of the city of that name (Map: Spain, D 4). It lies in a rich plain, and is engaged in the production of wine, hemp, grain, fruit, oil, etc. There are also some manufactures. Baza contains several fine churches, including the collegiate Church of San Máximo, and a beautiful promenade. Population, in 1897, 11,992. Under the Mohammedans Baza was a lively centre of trade, and had 50,000 inhabitants. Isabella of Castile reduced the city after a seven-months' siege in 1489. In 1810 the Spaniards were defeated here by the French under Marshal Soult.

BAZA. A wild negro people in Upper Nubia; with neighboring tribes they are called Shangallas by the Abyssinians.

BAZAINE, bȧ'zān', FRANÇOIS ACHILLE (1811-88). A marshal of France. Entering the army in 1831, he served with distinction in Algeria, in Spain, in the Crimea, and in the Italian campaign of 1859. He took part in the French expedition to Mexico in 1862, and from 1863 till the end of the war held supreme command of the French forces. His behavior toward Maximilian was insolent, and he sought to throw on him all blame for the failure of the French plans. At the outbreak of the great war with Germany, Bazaine was at the head of the Third Army Corps, near Metz. After the battles of Wörth and Spichern he took command of the main French armies, and on August 14, 1870, began a retreat from Metz. Defeated at Vionville, Mars-la-Tour, and Gravelotte, he retired within the fortifications of Metz, which was immediately invested by Prince Frederick Charles. Attempts to escape failing, Bazaine capitulated October 27, when 173,000 men, including three marshals and over 6000 officers, laid down their arms and became prisoners of war. In 1873 Bazaine was tried by a court-martial and sentenced to degradation and death for having failed to do his duty. The sentence was commuted to twenty years' imprisonment. But in 1874 Bazaine contrived to escape from the fortress on the Ile Sainte-Marguérite, on the southern coast, where he was confined, and ultimately made his way to Madrid, where he died, 1888. The bitterness of defeat, which rankles deep in the hearts of Frenchmen, makes it difficult to formulate a just estimate of Bazaine. Accused as a traitor by the general voice of the nation, he has also found apologists. His bravery was undeniable; but he was open to blame for his dilatoriness and his mingling of politics with war. It was probably political reasons that kept him in Metz until it was too late to break through. His condemnation was partly at least a concession to the national cry for vengeance. In his own defense Bazaine published *Rapport sommaire sur les opérations de l'armée du Rhin du 13 Août au 29 Octobre 1870* (Geneva, 1871); and *Episodes de la guerre de 1870 et le blocus de Metz* (Madrid, 1883). Consult also: La Brugère, *L'affaire Bazaine* (Paris, 1874), for an official account of the court-martial; and Comte d'Hérisson, *La légende de Metz* (Paris, 1888), for a vindication of Bazaine.

BAZALGETTE, Sir JOSEPH WILLIAM (1819-91). An English civil engineer, born at Enfield (Middlesex). He was appointed chief engineer to the London Board of Works, and as such built large portions of the embankments and sewerage systems of that city. He constructed three bridges across the Thames, and also the famous embankments bordering the river. As an expert on practical questions of municipal engineering, he was well known.

BAZÁN, bȧ-thän', EMILIA PARDO. See **PARDO-BAZÁN,** EMILIA.

BAZAN, bȧ'zäN', DON CÉSAR DE. See DON CÉSAR DE BAZAN.

BAZANCOURT, bȧ'zäN'kōōr', CÉSAR, Baron de (1810-65). A French military historian; director of the Library of Compiègne, under Louis Philippe. He was born in Paris, and was appointed official historiographer by Napoleon III., whom he accompanied during several campaigns. The results of these expeditions appeared in his works on *L'expédition de Crimée jusqu'à la prise de Sebastopol* (1856), *La campagne d'Italie de 1859*, and *Les expéditions de Chine et de Cochinchine* (1861-62). His other works include a *Histoire de Sicile sous la domination des Normands* (1846), and the novels, *Georges le montagnard* (1851), *Noblesse oblige* (1851), and *La princesse Pallianci* (1852).

BAZAR, bȧ-zär', or **BAZAAR** (Ar., Hind., and Pers. *bāzār*, a market). An Oriental market, sometimes covered, sometimes open; the region of the city given up to shops. Such a market when the shops are grouped about a square is called usually a *median*. The bazar is a series of streets largely covered, devoted to shops of the better class. Those belonging to the same specialty are grouped in the same street and separated merely by a partition. It is here that auctions take place—of slaves, for example—and here that merchants and clients meet for the transaction of business. In the most monumental bazars, the streets are covered with vaults, perforated with numerous apertures for light. Usually there is at least a central dome. Of the two principal bazars in Constantinople, the oldest was built in 1461, shortly after the capture of the city. The bazar is usually one of the principal monuments of a Mohammedan city; many cities had separate ones; Aleppo is said to have had 40. A good example is the chief bazar of Adrianople, that of Ali Pasha—a brick structure, 1800 ft. × 500 ft. with a gate at each end and four side entrances, entirely surrounded by walls and covered with vaults, making it comparatively fire-proof.

BAZARD, bȧ'zär', SAINT AMAND (1791-1832). A French Socialist and founder of Carbonarism in France. He was born in Paris, early entered the National Guard, and at the age of 25 was appointed a knight of the Legion of Honor. Shortly after the establishment by him of the Republican Society known as *Amis de la Vérité*, he organized in 1820 the famous French association of the Carbonarists, founded upon the Italian organization of the same name, but adapted to the needs of the French revolutionists. The society grew rapidly in numbers and influence; within two years after its establishment it embraced more than a quarter of a million members. In 1825 Bazard joined the Saint Simonists, and subsequently became the principal apostle of that movement, which under his influence spread rapidly. He followed up his public career on the new gospel by the publication of the famous journal, *L'Organisateur*, issued by the followers of the Saint Simonist School, and containing an accurate record of its proceedings. The chief work of the school, however, due also in great part to the influence of Bazard, was the *Exposition de la doctrine Saint Simonienne* (2 vols., 1820-30; latest ed., 1854). Owing to a schism among the members, Bazard severed his connection with the movement in 1831 and retired from public life. John Stuart Mill, in his autobiography, acknowledges his profound indebtedness to the writings of Bazard.

BAZARJIK, bä'zär-jēk'. A district town of Bulgaria, situated about 26 miles north of Varna (Map: Balkan Peninsula, F 3). It contains a mosque and a number of churches, and has an important annual fair. Population, in 1888, 10,717. The town was twice taken by the Russians, in 1774 and 1810.

BAZAROFF, bȧ-zä'rôf. A Nihilistic medical student in the *Fathers and Sons* of Turgenieff (q.v.).

BAZAS, bȧ'zȧs'. The chief town of an arrondissement in the Department of Gironde, France, on the Beuve, 33 miles southeast of Bordeaux. It is built on a rock, rising from the river; has a cathedral and remains of fortified walls dating from the Thirteenth Century, and several interesting mediæval houses. It carries on a trade in cattle, wine, and timber. Bazas anciently belonged to the Vasates; during the Religious Wars it was the scene of atrocious excesses and reprisals on both sides. Population, in 1896, 4806.

BAZIGARS, bä'zē-gärz'. A nomadic people of India, somewhat analogous to the gypsies of Europe. They recognize caste, are largely Mohammedan in faith, and forbid intermarriage with Hindus.

BAZOCHE, bȧ'zôsh', or **BASOCHE**. A guild consisting of the clerks attached to the Parlement of Paris, as well as the provincial parlements. When the French Parlement ceased to be the grand council of the King, and confined itself exclusively to administering justice, a distinction of name necessarily sprang up between those noblemen who formed the royal train and the attachés of the court of justice. The former were called *courtiers;* the latter, *basochians*. To keep up their dignity the Bazoche gathered round a mock king of their own, who resided at the Château des Tournelles or the Hôtel Saint Pol. The Bazoche was divided into chapters, each wearing the livery of its captain. In Paris there were several of these chapters: Bazoche of Parlement (du Palais); Bazoche of Châtelet; Bazoche of the Chambre des Comptes, which last body took the name of 'High and Sovereign Empire of Galilee.' Parlements in other parts of France had also their Bazoche. Their historical existence can be traced to the beginning of the Fourteenth Century, when Philip the Fair conferred on the brotherhood certain privileges. The President was called King, Prévôt, or Emperor. The principal authorities in this harmless monarchy, after the sovereign himself, were the chancellor, the masters of requests, the referendary, and the attorney-general. Henry III. suppressed the regal titles, and conferred all the privileges and rights attached to these offices on the chancellor. At this time it is said that the order included 6000 clerks. Still, the Bazoche continued to exist as a kingdom, minus its head, and affected on all occasions the language of royalty. Its jurisdiction included the consideration and decision of all processes and debates that arose among the clerks, being the court of last resort in such controversies. It administered justice twice a week, and also caused a species of coin to be struck which had currency among its members; but, judging from the proverb about *la monnaie de basoche*, it did not enjoy an immense credit in the outer world of hard cash. The mock monarch also enjoyed the privilege of selecting at his pleasure, yearly, from the French royal forests, a tall tree, which his subjects, the clerks, were in the habit of planting, on the 1st of May, before the grand court of the palace, to the sound of tambourines and trumpets. But this was not all. In the public sports this fantastic little kingdom was worthily honored; its chancellor had rooms at the Hôtel de Bourgogne; at the carnival the *basochians* joined themselves to the corps of the prince of fools, and to the performers of low farces and 'mysteries.' They also acted a species of satirical 'morality' (see MYSTERIES), in which they made extensive use of the liberty granted to them, in ridiculing vices and the favorites of fortune. Of course, they could not fail to provoke enmity and occasion serious scandal. Louis XII. patronized these amusements. In 1500 he gave the brotherhood of the Bazoche permission to perform plays in the grand salon of the royal palace. Francis I. witnessed them in 1538, but in 1540 they were interdicted. From these plays, however, the comedy of Molière was evolved. The Bazoche took an active part in the early Revolutionary proceedings, but the order was suppressed by the general decree of February 13, 1791.

BAZZI, bät'sē. See SODOMA, IL.

BAZZINI, bät-sē′nē. Antonio (1818-97). An Italian violinist and composer, born at Brescia, Italy. At the age of 12 he was a successful concert performer, and made many tours through Germany, France, Italy, and Belgium. At 17 he was appointed organist of a church in his native town. For four years, from 1843, he studied at Leipzig, devoting himself to Bach and Beethoven, almost exclusively. He had met Paganini when but 18 years old, and became completely influenced by that master's art and style. He has been classed with the Paganini school, and although criticised for mannerisms and sentimentality, was acknowledged to have brilliant technique of left hand and bow, as well as great vivacity of style. He was appointed professor of composition in the Milan Conservatory, and director seven years later. His compositions, which exhibit an assimilation of the beauties of Italian melody with the profundity and wealth of Teutonic harmony, include five string quartets, a string quintet, many compositions for the Church, an opera, *Turandot*, produced in 1867, and a symphonic poem. *Francesca da Rimini* (1890).

BDELLIUM, dĕl′lĭ-ŭm (Lat., from Gk. *βδελλιον*, *bdellion*, the equivalent of the Heb. *b'dōlakh* in Gen. ii. 12). A gum resin, resembling myrrh. High medicinal virtues were ascribed to it by the ancients, but it is no longer used. The bdellium mentioned in Gen. ii. 12 was probably not a gum resin at all; but what it was is uncertain.

BEACH, Amy Marcy Cheney (1867—). An American composer and pianist, born at Henniker, N. H. After elementary instruction from her mother, she studied harmony under Junius W. Hill, and piano with Ernest Perabo and Karl Baermann. Advanced musical theory she studied independently, making her own translations of Berlioz and Gevaert. Under her maiden name of Amy Marcy Cheney, and up to the time of her marriage to Dr. Henry Harris Aubrey Beach, in 1885, she was known as a successful concert pianist; since then she has devoted herself almost entirely to composition. The *Gaelic Symphony*, for full orchestra, conceded to be her best work, has been played by all the great national orchestras. Of scarcely less importance is the *Jubilate*, composed for the dedication of the Woman's Building, at the Columbian Exposition; a mass in E flat (Opus 5, 1892), for organ and small orchestra; a cantata for women's voices, *The Roses of Arontown*, and *The Minstrel and the King*, a similar work for male voices. Of her many compositions for piano and voice, *Valse Caprice*, *Fireflies*, *Children's Carnival* (instrumental), and a cyclus of fourteen songs, together with three vocal duets, are possibly the most successful.

BEACH, Harlan Page (1854—). An American missionary. He was born at South Orange, N. J., and graduated at Yale (1878) and at the Andover Theological Seminary. He was missionary to China from 1883 to 1890, and at the head of the School for Christian Workers in Springfield, Mass., from 1892 to 1895. His works include: *The Cross in the Land of the Trident* (1895); *Knights of the Labarum; Dawn on the Hills of T'ang* (1900).

BEACH, Moses Yale (1800-68). An American inventor and publisher. He was born in Wallingford, Conn., and in early life was a cabinet-maker. He invented a rag-cutting machine for paper-mills, and engaged in the manufacture of paper. In 1835 he acquired an interest in the New York *Sun*, a penny daily paper begun in New York about three years earlier, and soon became sole proprietor. Leaving the paper to his sons, he retired in 1857 with an ample fortune.

BEACH-BIRDS. A collective term used by American sportsmen for such small wading birds as, respectively, frequent marshy bays along the seacoast, or seek their food on ocean beaches. They are limicoles, such as snipes, sandpipers, willets, curlews, avocets, etc., described separately elsewhere. Compare Shore-Birds, and see Plate of Beach-Birds.

BEACHES, Raised. Tracts of ground at various elevations above the present sea or lake levels, which have evidently been beaches at some former time. Such raised beaches owe their present position to earth movements, which may have taken place rapidly, in connection with earthquakes, or more slowly, as part of the general system of changes attending the development of the earth's surface. At the present time, wherever the ocean waves and surf are acting upon the bolder headlands of islands or continents, it is found that the débris is being carried seaward, and that a comparatively smooth floor is being formed over a belt of variable extent lying below the sea-level. If this contingent should rise suddenly, it would be recognized as a terrace of raised beach. The characteristics of such beaches are: First, the nearly uniform elevation of the level terrace running approximately parallel to the present shore line; second, the presence of beds of water-worked sand and gravel; third, the presence in the beds of marine or fresh-water shells belonging to species that were living at the time the sand was underneath the water. In America such raised beaches have been found around the coast of Maine, on the coast of California and its adjoining islands, along the west coast of South America, and around the shores of many fresh-water lakes, and of the Great Salt Lake.

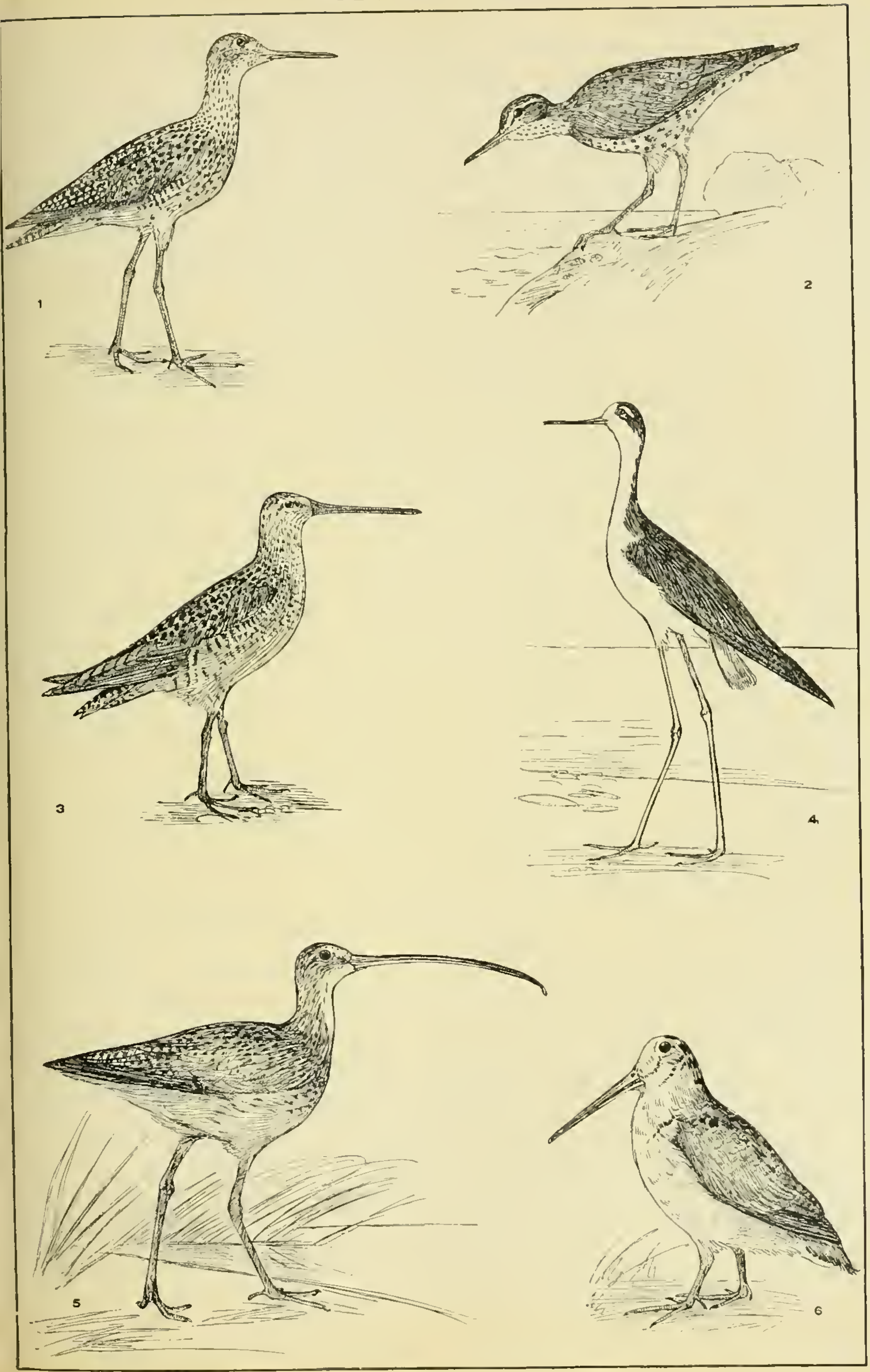
In Scotland a terrace extends around the bold coast of the west highlands and the western islands at an elevation of about twenty-five feet above present sea level. The famous parallel Roads of Glenroy extend on each side of the Valley of the Roy, the first pair at an elevation of 1139 feet, the second of 1060 feet, and the third of 948 feet, above sea-level. These were originally supposed to be raised marine beaches, but are now considered as beaches cut by the waters of a lake which once filled the valley.

The most interesting raised beaches are those surrounding the Great Lakes of North America. A careful survey of these beaches, made by Mr. G. K. Gilbert, has shown that they are at present not absolutely horizontal, but rise as much as five feet per mile as one proceeds northward and eastward; further, the southern shores of the present lakes show a distinct tendency to flooding or drowning. These facts lead to the conclusion that the whole plain bearing the Great Lakes is being tilted, rising toward the northeast (north 27 degrees east) and sinking toward the southwest.

BEACHES, Singing. See Musical Sand.

BEACH-FLEA, or **SAND-FLEA.** A minute terrestrial-amphipod crustacean which abounds

BEACH BIRDS



1. GREATER YELLOW LEGS (Totanus melanoleucus).
2. SPOTTED SANDPIPER (Actitis macularia).
3. DOWITCHER (Macrorhamphus griseus).
4. BLACK-NECKED STILT (Himantopus mexicana).
5. LONG-BILLED CURLEW (Numenius longirostris).
6. AMERICAN WOODCOCK (Philohela minor).

upon sea-beaches, and hops away with flea-like agility when disturbed. In summer they collect in vast numbers under windrows of sea-weeds, etc., where they serve as scavengers by devouring decaying animal matter. They form an important part of the food of shore-birds, tiger-beetles, etc. Those of the eastern United States belong commonly to the family Orchestridæ. See AMPHIPODA.

BEACH-GRASS. See AMMOPHILA.

BEACH-PEA. See LATHYRUS.

BEACH PLANTS, also called STRAND, SHORE, or LITTORAL PLANTS. Plants that grow above the water-line along the shores of oceans or great lakes. They form one of the edaphic groups of xerophytes (q.v.). The beach, as the term is here used, is composed of sand or gravel, and is essentially a product of wave-action; it comprises the zone which is, or has been, worked over by the waves. It is commonly delimited on the one side by the water-line, and on the other by dunes or sea-cliffs. The lower portion of the beach is washed by the waves of summer storms, and is devoid of life. Water-plants cannot grow there because of excessive exposure, while land-plants are excluded because of frequent wave-action. Beyond this zone is another, which is washed by the high waves of winter storms; here annual plants are found, but not permanent perennials, since the winter waves destroy them. Beyond the reach of any but exceptional waves is the upper beach, and here the conditions for life are much improved: not only annuals, but also biennials and perennials, become more or less abundant.

The most characteristic type of beach plant is the succulent annual, of which the Sea Rocket (Cakile) may be considered a good example, since it is a common beach plant along the ocean shores of America and Europe, and also along the shores of the Great Lakes. The development of succulent annuals on the beach is a fact of great interest, since this type of vegetation is peculiarly characteristic of deserts. This suggests that the beach is a highly xerophytic habitat; and such is indeed the case, for there is no habitat in ordinary climates where the exposure to wind, light, heat, and cold, is greater than here. Higher up on the beach there are often found biennial rosette plants, and perennials with long, underground stems, as in the Beach Pea (*Lathyrus maritimus*) and in the Sand Reed (*Ammophila*).

The vegetation of beaches is almost always sparse. But few species can endure the severe conditions, and even in the case of these few species, the individuals are commonly scattered. As a consequence, the sandy or gravelly soil gives the dominant tone to the landscape, as is the case in deserts. A comparison of the ocean beach with the beach of the Great Lakes brings out the fact that the floras are almost identical. It might be supposed that the influence of salt (see HALOPHYTES) would be indicated by a different assemblage of plants along the seashore, but scarcely any inland and coastal plant societies are so much alike as those of lake and ocean beaches. This fact shows that the xerophytic character of the beach conditions determines the nature of its flora. See ECOLOGY.

BEACH-PLUM. See PLUM, BEACH.

BEACH'Y HEAD (corrupted from Fr. *belchef*, *beau-chef*, beautiful head or headland). The loftiest headland on the southern coast of England, projecting into the English Channel, 2½ miles south-southwest of Eastbourne, Sussex (Map: England, G 6). It consists of perpendicular chalk cliffs, 564 feet high, forming the east end of the South Downs. Near this point occurred a famous naval battle, in which the French fleet under Tourville defeated the combined English and Dutch under Torrington (1690). The Belle Toute or Beachy Head Lighthouse, 2 miles to the west, was built in 1831. This lighthouse is 285 feet above the sea, in latitude 50° 44′ 24″ N., longitude 0° 12′ 42″ E.

BEA'CON (ME. *beken*, AS. *beácen*, *bēcen*, Ger. *Bake*; cf. AS. *beacnian*, Engl. *beck*, *beckon*, to make a sign). Any signal set upon a height, but especially the alarm-fires at one time used to spread the intelligence of foreign invasion or other great event. These fire-signals were in use in the earliest times. An instance is found in the book of the prophet Jeremiah, in his call, in chapter vi. 1, to the people of Benjamin to "set up a sign of fire in Beth-haccerem: for evil appeareth out of the north, and great destruction." Notices of beacons are found in the literary remains of ancient Persia, Palestine, and Greece. Another occurs in the tragedy of *Agamemnon*, by the Greek poet Æschylus. The commander-in-chief of the Greek Army at the siege of Troy is represented as communicating the intelligence of the fall of the city to his queen, Clytemnestra, at Mycenæ, in the Peloponnesus. The line consists of eight mountains, and the news is supposed to be conveyed in one night from Troy.

In England the beacons were kept up by a rate levied on the counties, and had watches regularly stationed at them. They were carefully organized while the Spanish Armada was expected. (See Macaulay's *Armada* for a vivid description of this.) In the United States, as early as 1635, there was a knoll at Boston known as Beacon Hill (leveled in 1811), from which an alarm was sent out by signal-fires in case of attack by Indians. During the Revolution a line of signals was established reaching across New England toward New Jersey and Pennsylvania, crossing New York at the Hudson Highlands. Two of these, above Fishkill, are now known as South Beacon and North Beacon. The latter was relighted at a celebration in 1883, and in 1899 the site was marked by a monument erected by the Daughters of the Revolution.

In maritime affairs a beacon is a guide or warning signal. In former times signal-fires, either placed in a cresset on top of a pole, or in a tower on an eminence, were used to signal the approach of an enemy or to spread a call or warning for any purpose, a chain of them often conveying intelligence to great distances. Various hills have received the name of beacon from the fact that signal-fires have at one time been lighted on them. At present lighthouses, or other objects, placed conspicuously on a coast, or over a rock or shoal, to give notice of danger, as well as signals erected for facilitating the triangulation of the coast, are known as *beacons*. Two principal characters are used for distinguishing beacons—color and shape; and the opinion given by the International Marine Conference, held in Washington in 1889, was that the first object to be attained from an international standpoint was uniformity. For that purpose color is the best means, as applying to all systems of whatever kind, while the shape admits of numerous exceptions. The color is also applicable in all countries and with little expense, whereas the immediate adoption of shape would involve changes of several existing systems. In consequence, it was recommended to adopt a uniformity in color, whereas the shape could remain optional. From an immense amount of data it was clearly shown that in the matter of beacons there has been a far greater lack of uniformity than in the matter of buoys, and even the different countries have not in themselves rigidly adhered to a fixed rule in relation to the construction of beacons. About the most extensive system of day-marks and beacons at use along the coast of the United States is found along the Florida reefs. Here the beacons are in some cases lettered, and in others numbered. The cage, shaft, vane, letter, or figure is of different color in adjacent stations, so that there may be no confusion. Combinations of red, white, and black are used; and as a full description of each is to be had in the sailing directions of that section, the navigator is always able to determine his position. See LIGHTHOUSE.

BEACONSFIELD, bēk′onz-fēld. A market-town of Buckinghamshire, England, 7½ miles northwest of Windsor. It is noted as the birthplace and residence of Waller, the poet, and Edmund Burke, and as giving its name to the title of Benjamin Disraeli, Earl of Beaconsfield. Population, in 1891, 1773; in 1901, 1570.

BEACONSFIELD. A municipality of Cape Colony, South Africa, 2 miles southwest of Kimberley (Map: Cape Colony, A 7). It owes its growth and importance to its diamond-mining industries. Population, in 1881, 4259; in 1891, 10,478.

BEACONSFIELD, LORD. See DISRAELI, BENJAMIN.

BEACON HILL. The hill north of Boston Common, so called from the fact that in the early history of Boston a beacon was set on it to give notice of threatened attacks by the Indians. The summit is occupied by the State House. Beacon Street, a noted residence street of Boston, extends along the slope of the hill skirting the Common and Public Gardens westward through the Back Bay District.

BEAD. In architecture, a small, convex, round molding, sometimes called an astragal. It is of frequent occurrence in architecture, particularly in the classical styles, and is used besides in picture-frames and other objects carved in wood.

BEAD. A variety of personal ornament, made of various materials, as glass, pottery, metal, bone, ivory, wood, jet, amber, coral, etc., and perforated so that it can be strung on threads and made into necklaces, bracelets, rosaries, etc., or worked on cloth as a kind of embroidery. The use of beads is of great antiquity, for they are found in the most ancient of the Egyptian tombs as decorations of the dead, and beads supposed to have been used as barter by the Phœnicians in trading with various nations in Africa are still found in considerable numbers, and are highly valued by the natives under the name of 'Aggry' beads. Ever since the Fourteenth Century the manufacture of glass beads has been chiefly engrossed by the Venetians. (See GLASS.) The manufacture is curious; the melted glass, colored or uncolored, is taken from the pot by two workmen, who slightly expand the collected mass by blowing down their blowpipes; they then open up the expanded glass, and join the two together, while still very soft. This done, they walk rapidly away from each other in opposite directions, in a long shed like a small rope-walk, and draw the glass, which retains its tubular character given by the blowing, etc., into rods of great length, and often extremely small diameter. On cooling, which takes place very quickly, these long rods are broken up into short lengths of about a foot, and a small number of these shorter rods are placed on a sharp cutting edge, after being annealed, and are chopped into lengths. The roughly cut beads are next mixed very thoroughly with fine sand and ashes, then put into a metal cylinder over a brisk fire, and turned round rapidly as they begin to soften with the heat. They are then agitated in water, which cleans away the sand and ashes, and leaves the holes free, after which they are strung.

BEAD, BEADE, or BEDE (allied to *bid*). A word which in Anglo-Saxon and Old English signified a prayer, and hence came to mean the small perforated balls of gold, silver, glass, ivory, hard wood, etc., used for keeping account of the number of prayers repeated. A certain number strung on a thread makes a rosary (q.v.). A *bedesman* or *bedeswoman* is one who prays for another. Persons of station and wealth in old times, "had regularly appointed bedesmen, who were paid to weary Heaven with their supplications." Bedesmen appointed to pray for the King and State sometimes lived together, and hence *bedehouse* is synonymous with an almshouse. A common form of signature at one time was: 'Your bounden bedesman,' meaning 'Your obedient servant.'

BEADLE, bē′d'l (OF. *bedel*, of Teutonic origin, akin to AS. *bydel*, proclaimer, from *bid*). Formerly an important parish officer, appointed by the vestry. He attended the vestry-meetings, executed its orders, and assisted the constable in minor matters. He has been largely supplanted by the verger, the visitor of the poor, and various petty town clerks.

BEADS, SAINT CUTHBERT'S. A title popularly given to the single joints of the articulated stems of encrinites. The central perforation permitted them to be strung as beads; and from the fancied resemblance, in some species, of this perforation to a cross, they were formerly used as rosaries, and associated with the name of Saint Cuthbert. They are also known as entrochites, or wheelstones.

BEAGLE, bē′g'l (origin obscure). A breed of diminutive foxhounds, formerly much used in hare-hunting; very similar to the harrier. For illustration, see DOGS. See HOUND.

BEAGLE, SIR HARRY. A character in Colman's comedy, *The Jealous Wife*. He is a typical country squire of the more vulgar class, with a great enthusiasm for dogs and horses. He offers to give one of the latter to Lord Frinket in exchange for Harriet.

BEAGLE, THE. A small brig of war, of 235 tons, engaged in surveying the southern coasts of

South America and Tierra del Fuego, and making a cruise round the world (1831-36), under command of Capt. Robert Fitzroy, R.N. Charles Darwin was the naturalist of the expedition.

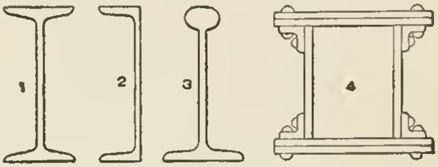
BEAK, or **BEAK'HEAD'.** A brass prow fixed at the head of the ancient galleys, to pierce the enemy's vessel by ramming. The term was applied later to a small platform at the fore part of the upper deck. It is now applied to the part forward of the forecastle, or knee of the head, which is fastened to the stem and is supported by the main knee. In modern ironclads this is strengthened and armored, having a considerable projection beyond the stem to provide for ramming. See RAM, MARINE.

BEAL, SAMUEL (1825-89). An Oriental scholar, and the first Englishman to translate direct from the Chinese the early records of Buddhism, thus throwing light also upon Indian history. He was born at Davenport and graduated from Trinity College, Cambridge, in 1847. After filling several curacies, he became a chaplain in the Royal Navy. He was on the *Sybille* during the China War of 1856-58, and also visited Japan. In 1857 he printed for private circulation a pamphlet showing that the Tycoon of Yedo, with whom foreigners had made treaties, was not the real Emperor of Japan. He retired from the navy in 1877, and was elected to the chair of Chinese in the University College in London. His reputation was established by his series of works which traced the travels of the Chinese Buddhist pilgrims in India from the Fifth to the Seventh Century, A.D., and by his books on Buddhism, which have become classics. Among his works are: *The Travels of Sung-Yun and Fa-Hien* (1869); *The Catena of Buddhist Scriptures from the Chinese* (1872); *The Romantic Legend of Buddha* (1876); *Texts from the Buddhist Canon, Dhammapada* (1878); *Buddhism in China* (1848); and *Si-Yu-Ki, Buddhist Records of the Western World*, 2 vols. (1884); a *Life of Buddha*, from the Chinese version of a Sanskrit original (Vol. XIX. of *The Sacred Books of the East*); and the *Life of Hienen-Tsiang* (1888), the great Chinese Buddhist pilgrim. He catalogued the set of books in the Buddhist Canon as known in Japan—a work of enormous proportions, sent to England by the Mikado's junior premier, Iwakura.

BEAL, WILLIAM JAMES (1833—). An American botanist, born at Adrian, Mich. He graduated at the University of Michigan in 1859, and at the Lawrence Scientific School in 1865; and in 1870 was appointed professor of botany at the Michigan Agricultural College. In 1880-82 he was first president of the Society for the Promotion of Agricultural Science. He is the author of *Grasses of North America* (1886 et seq.); *The New Botany* (1881); and *Seed Dispersal* (1898).

BEALE, LIONEL SMITH (1828—). An English physiologist and microscopist. He was professor in the University of London, but resigned in 1893. He was physician to the King's College Hospital for forty years, and was elected emeritus professor of medicine in 1896. He has written in opposition to Darwin's theories. Among his works are: *How to Work with the Microscope* (1857); *The Structure and Growth of the Tissues of the Body* (1861); *Protoplasm* (1869); *Life Theories: their Influence on Religious Thought* (1871); *Urinary Deposits and Calculous Disorders* (1868); *Our Morality and the Moral Question* (1886); *Life and Vital Action in Health and Disease* (1875).

BEAM (AS. *beám*, Ger. *baum*, tree). In engineering and architecture, a long piece of wood, stone, or metal used in a horizontal position to support a weight. Timber beams are usually rectangular in section, and may consist of one large piece of timber or of several smaller pieces joined, butted, or spiked together. Beams of steel or iron may be a single-rolled steel shape, such as an I-beam, or they may be composed of a number of suitable steel shapes riveted together to form a single structure. (See STEEL SHAPES; GIRDERS.) The term also has many special technical applications, as the beam of a weighing scale, the weaver's beam, the beam of a plow. In ship-building the beams are the strong, transverse pieces of timber, iron, or steel, stretching across a ship from side to side to support the decks and retain the ship's sides at their proper distance. For this reason the term is used to denote the widest part of a vessel's hull. The ends of a vessel's beams are supported by clamps and knees, and the centre by stanchions. The beams are given a crown in order that the decks may have a slight convexity to shed water. A *built-up beam* is formed of smaller beams, notched, scarfed, and bolted together. *Cellular beams* are formed of wrought-iron plates riveted together with angle-irons in the form of longitudinal cells, with occasional cross-stubs. *Composite beams* are composed of wood and metal, or of two different metals. *Kerfed beams* have slits in one side, made by saws, in order to facilitate bending the beam in that direction.



BEAMS.
1, I-beam; 2, Channel-beam; 3, Deck-beam; 4, Box-beam.

On the beam is an expression applied to any point or object at right angles to the keel, and is known as *on the starboard*, or *port, beam*, according to the side of the ship. *On the weather beam* is on the weather side of the ship, and *on the lee beam* is on the lee side. *Forward* or *abaft the beam* is the bearing of any object when seen in advance of, or astern of, a bearing on the beam. *On her beam ends* is the position of a ship that heels over so much to one side that her beams approach a vertical position; hence, to be *on one's beam ends* is to be thrown or lying on the ground, or to be in bad circumstances. Beam also means the oscillating lever of a steam-engine vibrating about a centre, and forming the medium of communication between the piston-rod and the crank-shaft; also called *working-beam* or *walking-beam*.

BEAM. The English translation for a number of Hebrew words. It refers to the beam of a building (II. Kings vi. 2, 5; II. Chron. iii. 7; Song of Songs i. 17; I. Kings vi. 9, and elsewhere); but in Judges xvi. 14 the reference is to a weaver's loom, as also in I. Sam. xvii. 7. The famous passage in which beam occurs is in Matt. vii. 3-5, and Luke vi. 41-42: "And why beholdest thou the mote that is in thy brother's eye, but considerest not the beam (Gk. δοκός, *dokos*) that is in thine own eye?" Mote signifies any light, dry particle, such as a dust-grain, or bit of straw.

BEAM-ENGINE. See STEAM-ENGINE.

BEAM'ING. A preliminary process to hand weaving, which consists in winding the web on the weaver's beam, the two essential requirements being firmness in the winding and evenness in the spreading of the yarn. Beaming was a special employment followed by workmen trained to the business as beamers, and is not employed in modern weaving by machinery. See WEAVING.

BEAM'-TREE' (*Pyrus aria*). A tree from 20 to 40 feet in height, native of almost all parts of Europe and of corresponding climates in Asia, not uncommon in the mountainous districts of Great Britain, and frequently planted. It has a straight, erect trunk, and a round or oval head; the leaves are ovate, cut and serrated (in some varieties, deeply lobed), white and downy beneath; the flowers in large terminal corymbs; the fruit scarlet, of the size of small peas. The fruit is acid and astringent, but becomes agreeable by incipient decay; it is sometimes called sorb or service-berry, and resembles the true serviceberry (q.v.) in quality, although it is much smaller. Beer is made from it by fermentation. Its very hard and fine-grained wood is used for cogs for the wheels of machinery. The whiteness of the foliage makes the tree—sparingly introduced—ornamental in plantations. See PYRUS.

BEAN. An annual plant of the order Leguminosæ; widely cultivated for its seeds (beans) and pods, which are used as a food for both man and animals. The whole plant of some species is frequently grown for forage and green manuring. The Broad Bean (*Vicia faba*) is the common bean of Europe, of which the Broad Windsor and Mazayan are the best-known varieties. It has been in cultivation from remote times. The plant is erect, 2 to 4 feet high; has thick, angular stems, leaves with 2 to 5 oval leaflets; flowers in clusters, generally white with black-eyed wing; pods large and thick, and beans thick, flattened, and generally angular. The varieties and subvarieties in cultivation are numerous and variable. They are grown both in the garden and field for forage and as human food. The plant is not well adapted to the hot, dry summers of either the United States or Continental Europe, but succeeds well in England. It requires a heavy, rich, and well-drained soil. The Scotch, or Horse Bean, belongs to this species, and is cultivated to considerable extent as a forage crop. *Phaseolus vulgaris*, the Kidney Bean of Europe, is the common garden and field bean of the United States. It was introduced into Europe in the Sixteenth Century, probably from South America. New varieties of this species are easily originated, and more than 150 varieties are in cultivation in the United States. Kidney beans are generally divided into two groups—tough-podded and edible-podded. There are bush and pole varieties of each group. Many of the 'wax' or string beans, and most of the shell-beans which are eaten before fully ripe, belong to this species. A few varieties are grown as field crops, and the product is sold as dry beans. They may be planted either in hills or drills after all danger of frost is past, and require a warm, loose soil.

The Lima Bean (*Phaseolus lunatus*) is a climbing species of South American origin, bearing very flat, broad pods, with short, flat seeds, slightly kidney-shaped. It is grown to a limited extent in various parts of the United States, and especially in California, where most of the seed is now raised. The Soy Bean (*Soja hispida* or *Glycine hispida*) is the common bean of China and Japan. It is grown in Europe, and in some of the Southern and Southwestern States to some extent as a forage and soiling crop. (See SOY BEAN.) The Cowpea (*Vigna catjang*) belongs to the bean family. It is the chief forage, soiling, and green manure crop of the southern United States. (See COWPEA.) The Scarlet Runner Bean (*Phaseolus multiflorus*) is an ornamental climber used to a limited extent as string and green-shell beans in Europe, especially in England. The frijole (*Phaseolus*, spp.) is a small flat bean, raised in the southwestern United States, as well as in Mexico and other Spanish-American countries, where it ranks next to maize as a staple food. Other beans, grown to a considerable extent in Oriental countries, but rather uncommon elsewhere, are the Lablab Bean (*Dolichos lablab*), Asparagus Beans (*Dolichos sesquipedalis*), Mungo Beans (*Phaseolus mungo*), and Locust or Carob Beans (*Ceratonia siliqua*). The Velvet Bean (*Mucuna utilis*) has lately come into cultivation in a number of Southern States as a forage plant and soil-renovator. It has about the same feeding and fertilizing value as the Cowpea. The Velvet Bean does not ripen its seeds north of Florida and the Gulf-coast States. For illustration see LEGUMES.

FEEDING AND FOOD VALUE. The ripe seeds of the bean are used to a limited extent in the United States as a feed for farm animals, while the whole plant is sometimes used as forage. In bean-growing districts the culls (which are not of good enough quality for human food) can usually be purchased at a low price, and are a cheap feed, as they are rich in proteid matter.

In Europe horse-beans are frequently fed to horses, especially to those required to perform long-continued or severe labor. Sheep are fond of raw beans. For other farm animals, it is stated, beans may profitably be cooked. Beans are suitable for combining with corn or other grain rich in carbohydrates. Like other leguminous crops, bean forage is comparatively rich in proteids. The Locust or Carob Bean is grown in the Mediterranean region as a cattle-food. The Velvet Bean, too, has recently attracted attention as a forage crop.

As a food for man beans are extensively used, green or dry. In many varieties the immature pod has little fibrous matter, and is eaten with the seeds as String Beans. Dry-shelled beans have the following percentage composition: Water, 12.6; protein, 22.5; fat, 1.8; carbohydrates, 59.6; mineral matter, 3.5. The fuel value per pound is 1605 calories. Fresh-shelled beans contain per cent.: Water, 58.9; protein, 9.4; fat, 0.6; carbohydrates, 29.1; mineral matter, 2.0. The fuel value of fresh-shelled beans is 740 calories per pound. String Beans contain per cent.: water, 89.2; protein, 2.3; fat, 0.3; carbohydrates, 7.4; mineral matter, 0.8; the fuel value is 195 calories per pound. The Windsor Bean is eaten green or ripe, being the common bean of many regions of Europe. In America the Navy or Kidney is the bean most commonly eaten green or dry. Most of the varieties of String Beans belong in this class. The Lima Beans are of excellent flavor and quality, and are favorites, green or dry. In Europe, especially in England, the Scarlet Runner furnishes string and shell beans. The Asparagus Bean is becoming favorably known as a string bean.

Green-shell Beans and String Beans are usually cooked in water, and prepared and served in a variety of ways. Dry beans are used for soups, purées, 'baked beans,' and other dishes. To develop their flavor long cooking is desirable. Judged by their composition, fresh beans compare favorably with other green vegetables. Dry beans are certainly a very nutritious food. The latter are especially rich in protein, and are thus fitted to replace meat to some extent in the diet. Taking into consideration the high food value of beans, their cost is usually low. It must be remembered, however, that, if eaten in large quantities, beans are less thoroughly digested than cereals. Owing to the production of methane by fermentation in the intestines, beans are liable to cause flatulence.

Beans are sometimes ground to 'bean flour.' Large quantities of String Beans and Shell Beans are dried by evaporation or canned. Cooked dry beans are also canned. String Beans are sometimes preserved with salt, and allowed to undergo a peculiar process of fermentation.

The Frijole is much eaten, green or dry, in the southwestern United States, as well as in Mexico and other Spanish-American countries. The dry bean is cooked in a variety of ways, and is often highly seasoned with chilies. The pods of the Locust or Carob Bean are often sold by confectioners under the name of Saint John's Bread. The seeds of this bean are surrounded by a sweet mucilaginous pulp, which is eaten to a considerable extent, especially in the Mediterranean region, as are also similar portions of the pods of the Honey Locust (*Gleditschia triacanthos*), Soy beans (q.v.), and Cowpea (q.v.).

Bean Diseases. The principal fungus disease to which the bean is subject is known as anthracnose, and is caused by the fungus *Colletotrichum lindemuthianum*. The fungus attacks stems, leaves, and pods of the bean, its presence being most conspicuous upon the pods, in which it causes deep, dark pits, seriously depreciating their value. The disease may be carried from one crop to another through the seed. Infected seeds are wrinkled and discolored, and all such should be rejected, as plants growing from them are sure to be affected, and they may convey the disease to otherwise healthy plants. Various treatments have been suggested for combating bean anthracnose, but careful selection of seed will probably give the most satisfactory results.

A rust of bean-leaves, caused by *Uromyces phaseoli*, is sometimes troublesome, causing injury by defoliating the plants. The first appearance of rust may be recognized by small, nearly circular brown dots, which contain a brown powder, the spores of the fungus. Later the spots are larger and the spores black. The liberal use of Bordeaux mixture (see Fungicides) will prevent this disease. A mildew of Lima beans, due to *Phytophthora phaseoli*, is sometimes destructive. Loss of the crop may be prevented by the use of suitable fungicides.

BEAN, Saint Ignatius. See Strychnos.

BEAN, Tarleton Hoffman (1846—). An American ichthyologist, born at Bainbridge, Pa. In 1892 he became associated with the United States Fish Commission. From 1880 to 1895 he was curator of fishes at the United States National Museum, and from 1895 to 1897 was director of the New York Aquarium, which he organized. He was the commissioner in charge of fishes at the World's Columbian Exposition, 1893, at the Atlanta Exposition in 1895, and at Paris in 1900. He published, with G. Brown Goode, *Oceanic Ichthyology* (Cambridge, 1896); also descriptive lists of the fishes of New York, Pennsylvania, and other districts; and many contributions to the publications of the Fish Commission, National Museum, and various societies.

BEAN-FEAST, also called **WAYZ-GOOSE**. The English custom of an annual outing and dinner of workmen. It is either given by the employers or subscribed for by the workmen themselves. The name or names are possibly derived from the fact that beans, or a bean-goose, figure prominently in the repast.

BEAN-GOOSE. The small gray goose of Great Britain and Northern Europe. See Goose.

BEAN-KING'S FES'TIVAL. A social rite principally observed in France, from which country it would seem to have been transplanted to Germany. On the evening of Twelfth Day, the Feast of the Epiphany (January 6), companies assemble to spend a few hours in mirthful relaxation. A large cake is baked, with a bean hidden somewhere in it. The cake is then divided into pieces, each person present receiving one, and whoever obtains the piece with the bean is king for the year. In this capacity he holds a mock court and receives the homage of the company, who also amuse themselves with other diversions. The Bean-King, however, is compelled to pay for his dignity, for he has to give an entertainment on the next Twelfth Night, that an opportunity may be afforded to choose another king. In France this custom was, at an earlier period, so common that even the Court indulged in it, although the Church, in the Seventeenth Century, exerted itself zealously for its suppression. It has left a trace in the popular expression for a lucky man, 'Il a trouvé la fève au gateau' ('he has found the bean in the cake'). The opinion that the Bean-King's Festival owes its origin to the Roman saturnalia, when even the children, partaking in the universal glee, were wont to elect a king, is not destitute of probability.

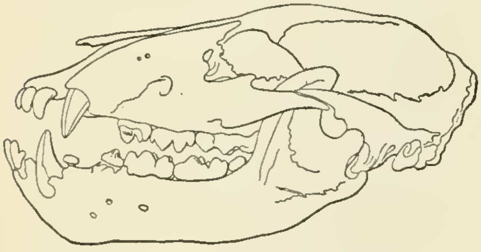
BEAN-TREE. See Laburnum.

BEAN-WEEVIL. A small, dark-colored downy beetle (*Bruchus fabæ*), which infests dried beans. See Weevil.

BEAR, bâr (AS. *bera*, Ger. *Bär*, possibly akin to Lat. *fera*, wild beast, Gk. *φήρ*, *phēr*, beast, Skt. *bhalla*, bear). A large, shaggy plantigrade beast of prey, representing the carnivorous family Ursidæ. Bears are native to all the wilder parts of Europe, Asia (with its closely adjacent islands), North America, and the Andean region, but are absent from Africa, except the Atlas Mountains, and Australasia. As they thrive in confinement, they have always been familiar objects in menageries, and are thus among the best-known of beasts.

Characteristics. Most bears are bulky, and some exceed in size any other carnivore; but this appearance of bulk is largely due to the looseness of the skin, the length of the coarse fur of their coats, the lack of a visible tail, and the comparative shortness of their legs, the whole sole of the foot being pressed to the ground, instead of the toes only, as in most carnivores. In their relationships they stand between the dogs and the fur-bearers (Mustellidæ), but their nearest relatives are the raccoons. Their fossil ancestry is largely represented, and may be traced back to generalized forms in the early Tertiary, whence both dogs and bears seem to have descended by divergent lines.

The bear's head is broad and massive, with extended and somewhat pointed jaws, well furnished with teeth, but lacking the muscular power possessed by dogs. They have 6 cutting teeth above and 6 below, 1 canine tooth on each side in each jaw, with 4 false molars and 2 molars (or grinders) on each side above, and 4 false molars and 3 molars below. The false molars in general are soon shed. The true molars are very large, and have tuberculous crowns suitable for grinding the vegetable food which forms a large part of their fare, and which the loose articulation of the jaw permits. The skeleton is massive and the muscles 'plated' and of very great length, while the feet are armed with powerful claws adapted to digging in the ground and to moving or tearing to pieces logs or rocks. All but the heaviest bears are able to climb trees. Their ordinary movements are slow and rather clumsy; yet, when impelled by rage or fear, they will run for a short distance, upon level ground, with a speed that taxes a horse to follow, and will make their way over rocks, rough ice, or up and down steep declivities, or among trees, with surprising quickness and agility. Their eyes are small and their eyesight is probably not very effective; but their hearing, though the ears are externally small, round, and furry, is acute, and their sense of smell is keen. Unless provoked or fearful for the safety of their young, they are not usually aggressive in disposition, but are likely to display curiosity, rising upright upon their hind legs and surveying the intruder calmly. They are rarely cowardly, and when angered or brought to bay will defend themselves or attack most fiercely, seeking to strike their enemy down, or to seize him in a crushing hug and tear him to pieces with their teeth. The larger northern bears are, therefore, justly regarded as very dangerous beasts.



TEETH OF THE BEAR.

Skull of a young grizzly, showing characteristic dentition.

Food and Reproduction.—Bears are adapted by their teeth and digestive organs to a wide variety in food, and no animal is more omnivorous. Besides the flesh of such animals as they can capture, including pigs, calves, colts, and sheep, they eat fish (the chief diet with some species) and reptiles. They are also fond of fruits, berries, bulbous roots, leaves, herbs, grass, and birds' eggs, and of insects and honey, for which they will dig up ant-hills and tear to pieces bees' nests and logs. They require an abundance of water, and are not loth to enter it, some species being remarkably strong swimmers. They go about in pairs, or sometimes in small bands, and are diurnal rather than nocturnal in their habits, though often abroad at night. Each family has some sort of lair in a cave, dense thicket, or some similar place, varying with the circumstances; and there, in the early spring, are brought forth from one to four (usually two) young, which will remain with the mother until fairly well grown. The period of gestation is about seven months. In cold countries the birth of the young finds the mother still in hibernation, which is more or less complete for all the northern species, according to the degree of cold and the amount of snow, which prevents their seeking or obtaining much food. Hence, when they come out in the spring they are likely to be thin and weak. The voice of bears is expressed in whines and coughing growls.

Fur.—The skin of bears forms a fur pelt useful for robes, overcoats, and rugs, and increasing in value with its growing rarity. A complete and ornamentally mounted skin, in the form of a rug, is worth in New York from $75 to $1000 for that of a polar bear, $100 to $500 for a grizzly, and $50 to $250 for a black or brown bear. The flesh is good food, the fat is valuable for the unguent called bear's grease, and the teeth and claws are turned into ornaments by civilized as well as savage artisans.

Classification. The classification of bears is not yet satisfactorily determined, for several so-called species of wide distribution vary and blend confusingly. Naturalists of good judgment have even asserted that all the brown and black bears of the world are identical in species, leaving only the polar bear as another species. Ordinarily, however, the following species are recognized: Polar Bear, and perhaps the Brown Bear (Circumpolar), Brown Bear, Himalayan Black Bear, Japanese Bear, Sloth Bear, and Sun Bear (Old World): Black Bear, Grizzly, Glacier Bear, Kadiak, Dall's Alaskan, and Barren-ground Bears—the last three, perhaps varieties of the Brown Bear (North America): Spectacled Bear (South America). See Plate of Bears.

Polar, White, or Ice Bear. The Polar Bear (*Ursus*, or *Thalassarctus maritimus*) is an inhabitant of the entire Arctic regions, where it seems to be extremely numerous upon all coasts and islands, and may wander a vast distance from land upon the ice, or even by swimming, for it has been encountered in the open sea many miles from shore, and sometimes drifts a long way south on ice-floes. In color it is creamy white, with black claws, and the color does not change to white in winter, as is the case with most Arctic animals. It is one of the largest of bears, and has an elongated neck and straight head, so that specimens may exceed 9 feet from nose to tail. Its limbs are comparatively slender, its feet disproportionately long and hairy upon the soles, giving it a firm hold upon the ice and power in swimming. Its food is mainly seals, which it captures both on land (or ice) and in the water, with great activity and cunning; but it also feeds upon such fish as it can catch in shallows or find dead, and in summer it regales itself on marine grass. Its sense of smell enables it to detect concealed food, and Arctic travelers find it difficult to build 'caches' strong enough to withstand its efforts. Although a dweller in the coldest and most wintry part of the globe, this bear is abroad at all seasons, and brings forth its young in no better chamber than a cavern scratched in the snow, which may cover the mother and her nursing young for many days before she is able to lead forth the cubs.

The 'European' Brown Bear has been well known in captivity, as well as wild, ever since the days of the Roman arena, and it is still a resident in every 'zoo' and the docile companion of wandering 'bear-tamers.' It survived in Great Britain until nearly the Twelfth Century, and is still to be found in the Pyrenees, eastern Alps, and thence through Russia, Syria, and Central and Northern Asia to the Himalayas and Kamchatka. It is probable, also, that the so-called barren-ground bear of the Hudson Bay region and the great brown bears of Alaska (see below) are geographical races of this species, of which, also, the almost white isabelline, or snow bear, of the Himalayas, and the Syrian bear (mentioned in the Bible and still ranging the mountains of Palestine) are local varieties. Everywhere it is a solitary denizen of forests and mountains, affording good sport in Europe, and of great service to the barbarians of northeastern Asia, who depend largely upon it for food and clothing. It is too well known to require particular description. For its history as an object of ancient sport and its employment in 'bear baiting,' etc., consult Harting, *British Animals Extinct Within Historic Times* (London, 1880).

The Himalayan Black Bear (*Ursus torquatus*) and the Japanese Bear (*Ursus japonicus*) are rather smaller species, usually glossy black. They resemble the American black bears, and are held in high respect by sportsmen.

The Sun Bear, or Bruang (*Ursus Malayanus*), of the Malayan Peninsula, Java, Sumatra, and Borneo, represents a distinct genus (Helarctus), in the view of many students, which is known also by several fossil species, including the huge Cave Bear (*Ursus spelæus*) of ancient Europe, supposed to have been exterminated by prehistoric man. The size is much less than that of either the brown or the sloth-bear, the head broad and short, the fur short and close, and the tongue and lips remarkably strong and flexible. With this go very long, strong claws, fitted for tearing to pieces ant-hills and other insect retreats, whose inhabitants are easily gathered by means of the extensile, glutinous mouth. It inhabits dense mountain jungles and climbs expertly. Its color is black, marked with a white crescent (orange in the Bornean variety) on the breast. It is peaceably inclined, but fierce and aggressive when brought to bay, rising upon its hind legs and attacking with its long, sharp claws; but taken young, or bred in captivity, it becomes an amusing and somewhat intelligent ally of the showman. One kept as a pet by Sir Stafford Raffles, the most prominent of the early English governors and describers of Malaya, has become famous in ursine chronicles.

The Aswail, Sloth-Bear, or Honey-Bear (*Ursus*, or *Melursus*, *labiatus*) is a species inhabiting the jungles of all Peninsular India and Ceylon, and is the juggler's bear of that region, where its facial grimaces and generally comical appearance are of great service to the wandering showman. This quaintness of countenance is due to the toothless condition of the front of the gums, where the incisors are lost in early youth, and to the fact that the lips are very long, and they and the whole snout are soft, extensile, and mobile to a surprising degree. These and other features are so pronounced that this bear has been separated in the genus Melursus by most students. It is submissive and teachable in captivity; but in freedom, when it habitually makes its home in some rocky cave in the jungle, it is brave, and held in much respect by hunters. Its size equals that of the brown bear, yet it climbs about fruit-trees with great ease. Its fur is peculiar, long, shaggy, and unkempt, remotely suggesting that of a sloth, and black in color, except for the whiteness of the muzzle and space about the eyes and a conspicuous V-shaped white mark on the breast. It seems to eat very little flesh, but lives mainly on fruit and insects, especially ants, termites, and the combs of honey-bees, in securing which its extensile lips and tongue find their special use; hence the term 'honey-bear.'

The American Bears are confusingly alike, and conservative naturalists are unwilling to admit the reality of so many species as are distinguished in the list below. It is even questioned whether the Spectacled Bear (*Ursus ornatus*) of the high forests of the central Andes be not merely an isolated variety of the black bear, distinguished by its small size and the yellowish, goggle-like rings around its eyes. The latest account of the North American Ursidæ (Elliot, *Synopsis of the Mammals of North America*, Chicago, 1901) makes the following list of subgenera and species, following the views of Dr. C. Hart Merriam: Polar Bear, *Ursus* (*Thalassarctus*) *maritimus*; Kadiak Bear, *Ursus* (*Ursus*) *Middendorffi*; Dall's Bear, *Ursus* (*Ursus*) *Dalli*; Grizzly Bear, *Urus* (*Danis*) *horribilis*; Barren-ground Bear, *Ursus* (*Danis*) *Richardsoni*; Black Bear, *Ursus* (*Euarctus*) *Americanus*; Louisiana Bear, *Ursus* (*Euarctus*) *luteolus*; Florida Bear, *Ursus* (*Euarctus*) *Floridans*; Glacier Bear, *Ursus* (*Euarctus*) *Emmonsi*.

The Kadiak Bear attains the largest size of all known bears, and is the most bulky of carnivores, specimens not regarded as the heaviest having weighed 1200 pounds; many, however, are comparatively small. This huge species was discovered to science about 1895, on Kadiak Island, Alaska, where it is said to be numerous, but hard to get; and it is also believed to range the forested mountains of the neighboring mainland. It seems to subsist mainly on fish, which it scoops from the water with its paws, especially at the season when the streams are filled with salmon and other species ascending them to spawn. In color this bear "varies greatly among individuals, being of various shades and combinations of dark and yellowish browns." Dall's, or the Sitka Bear, seems separable from the Kadiak only by fine points of skull-structure. It inhabits the Alaskan coast country, between Copper River and Baranov Island. Both of these 'species' are regarded by some naturalists as local varieties of the Siberian race of brown bears, and by others as local races of the grizzly.

The GRIZZLY BEAR of western North America is perhaps, on the average, the largest, and certainly is the most formidable of the family. It is justly regarded by sportsmen as the most dangerous beast in America, and at close quarters is the equal of any elsewhere in its reckless courage, muscular power, and ability for offense: the name *horribilis*, however, was a mere translation by Ord of his 'grisly' into Latin, and refers to color, not to character. When the mountain men speak of it as 'Old Ephraim,' they pay the respect of knowledge to power. Its range, before the encroachments of civilization, was northern Mexico to the Arctic Circle, and from the Pacific Coast eastward into the plains east of the Rockies as far as circumstances favored, probably as far as the great bison herds were wont to travel; but everywhere it preferred forests. It is still to be found throughout the higher parts of the Rocky Mountains and the Sierra Nevada, increasing in frequency toward the north, and reaching its acme of both size and numbers in Alaska. The size varies greatly, but a length of 9 feet and a weight of 1000 pounds are given as dimensions reached by many specimens. Their color is equally variable, the typical form being described by Elliot as "usually brownish yellow, with a blackish dorsal stripe; mane reddish brown, darkest near tips of hairs, which are brownish yellow or brown: legs generally black or blackish brown." Some specimens ('silvertips') are prevailingly light gray, due to the points of the hairs being white; others ('cinnamons') are warmly reddish, and others nearly coal black. Their habits and methods of life seem as diverse as their appearance and habitat.

These great bears hibernate little, if any, and are abroad by day as well as by night; range the heated plains or jungly valleys, or climb to the snowy peaks with equal ease. Often they go alone, but frequently travel in pairs or gather in small herds. One striking peculiarity, due, perhaps, to their great weight, is that they never climb trees, even as cubs. Nothing edible comes amiss as food. In former days they seized upon the stupid buffalo, and were able to vanquish even the heavy bulls by the weight and tearing power of their mighty paws, and in these days range-cattle are frequently destroyed; while those of the northwest coast region are expert in scooping up fish, and subsist largely on salmon and the like. All are fearless of water. Although so terrible when enraged, there is no evidence that the grizzly is more quarrelsome than other species; and the tales of an undying feud between it and the black bear or the puma are largely romances. The attitude of these bears toward mankind cannot be stated dogmatically, nor foreseen in any particular instance. They may quietly withdraw or run away in a panic (as the present writer has known them to do), or stand their ground without aggression if let alone; on the other hand, many a man has lost his life by a totally unexpected and terrifically impetuous attack. Says J. H. Porter (*Wild Beasts*, 1894, p. 371), in a wise summary:

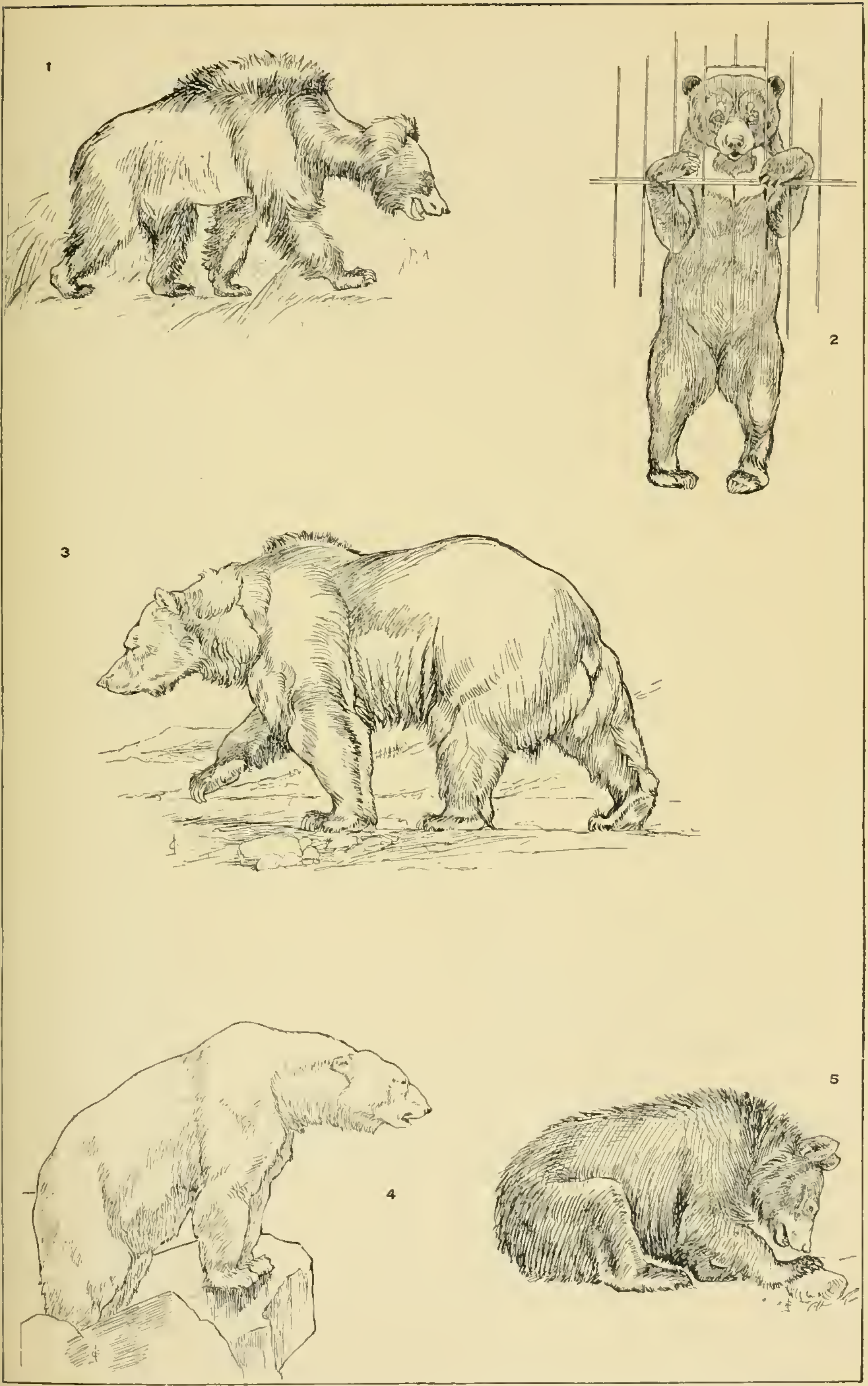
"No writer of any note except General Marcy has, as far as the author knows, denied that a grizzly bear soon comes to bay, and that he then devotes his energies to destruction with entire single-mindedness. Those who have met him, alike with those who have acquainted themselves with any completeness with the observations of others, know that this brute's patience under aggression is of the briefest, and his inherent ferocity easily aroused. When it is injured, the animal is exceptionally desperate, and fights from the first as a lion, tiger, and jaguar are apt to do only in their death rally. Colonel Dodge expresses the best opinions upon this point in saying that 'when wounded, a grizzly bear attacks with the utmost ferocity, and regardless of the number and nature of his assailants. Then he is, without doubt, the most formidable and dangerous of wild beasts.' 'In some way it has come about,' says Lockwood, 'that . . . Bruin has secured for himself an almost superstitious respect.' The way he did so has just been mentioned. Men had reason to fear him, and their veneration followed as a matter of course. It was because he proved 'most formidable and dangerous' that Schwatka found among the Chilkat Indians the highest clan called brown bears, and for a like reason the native warrior wore his claws as a badge of honor. Ferocity, prowess, and tenacity of life appear most conspicuously in accounts of actual conflict. Enough has been said with respect to the first-named trait, and no one ever called the others in question."

The Indians and early hunters captured the animal in pitfalls and very strong traps, or worried it to death by numerous shots. A single bullet fortunately planted in heart or brain may overcome it, but it has been known to survive many heavy balls. It remains one of the prime objects of sportsmen's ambition, and one of the most valuable prizes of the professional hunter, since its pelt, when in good condition, will bring a large price in the market.

These remarks apply in a greater or less degree to the Alaskan bears already mentioned, and to the Barren-ground Bear, a smaller, whitish-brown form inhabiting the treeless regions between Hudson Bay and the Coppermine River, whose separate specific identity is still subject to discussion.

The BLACK BEAR remains to be described. It is more widespread than any other in America, being found primitively wherever forests existed on the Continent north of Mexico. Civilization has restricted this area of residence; yet these bears remain wherever any considerable tracts of forest exist, and are frequently a pest to farmers by their forays upon the pig-sty and sheepfold. Their size varies, but never reaches the bigness of the grizzly; the color seems normally black, but varies through brown and reddish to yellow. Some so-called 'cinnamon' bears are of this species, and some are grizzlies. Their habits and food are closely similar to those of the European Brown Bear, with which some writers consider them specifically identical. They climb trees easily, are courageous, and may be very ugly customers when brought to bay, but are

BEARS



1. INDIAN SLOTH BEAR (Melursus ursinus).
2. MALAYAN SUN-BEAR (Ursus malayanus).
3. GRIZZLY BEAR (Ursus horribilis).
4. POLAR BEAR (Ursus maritimus).
5. AMERICAN BLACK BEAR (Ursus americanus).

not often aggressive toward men. Those of Texas and Florida are by some regarded as separate species, but most naturalists consider them geographical varieties.

Possibly this is equally true of the small GLACIER BEAR, first described in 1895, which inhabits the Saint Elias Alps of the central coast region of Alaska; but this will probably be found a tenable 'species.' It is smaller than the average of black bears, and unique in its color, which is hoary gray, closely resembling that of a silver-fox, most nearly white on the under surfaces. "The fur is not very long, but remarkably soft, and with a rich under fur of a bluish-black shade, numbers of the long hairs being white" or white-tipped. The sides of the face are bright tan, and the claws are small, much curved, sharp, and black. Little is known as yet as to the special habits or food of this interesting little bear.

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BEAR, GREAT AND LITTLE. See URSA MAJOR AND URSA MINOR.

BEAR ANIMALCULE, or **WATER-BEAR.** A minute creature related to the mites and other Arachnoids of the group Tardigrada (q.v.). These animals are generally found in wet moss or sand, often in company with rotifers.

BEAR-BAITING. A sport which consisted of setting a pack of dogs upon a bear, which was usually tied to a stake. It was an established amusement in many countries. In England it was known as early as the reign of Henry II., but was prohibited by Parliament in 1835. Queen Elizabeth not only allowed them the benefit of her royal patronage, but attended the bear-baitings in person. The Puritans hated the sport, "not because it gave pain to the bear," as Macaulay has recorded, "but because it gave pleasure to the spectators." The place where bears were kept and publicly baited were called bear-gardens. "Looks like a bear-garden," is a common English expression used to this day to designate any disarranged or ill-kept room or grounds.

BEAR'BER'RY. See ARCTOSTAPHYLOS.

BEARD. The hair which grows on the chin and cheeks of men. The beard is the distinctive sign of manhood, although exceptional instances occur of women with beards equal to those of men. The presence of the beard is an ethnological characteristic; it is found especially luxuriant among the Celtic and Slavic races, and scarcely at all among the North American aborigines, who customarily eradicate the few hairs which grow on their faces. It is usually the same color as the hair on the head, though shorter, stronger, and more wiry. In early times the beard was considered by almost all nations as a sign of strength and manhood, carefully cherished, and almost regarded as sacred. Its removal was regarded as a degrading punishment. (See II. Sam. x., for the case of David's ambassadors.) The Moslems have habitually observed a great care of the beard, carrying combs about with them for the purpose of dressing it. It is their custom to do so immediately after prayers, while still on their knees; the hairs that fall out are carefully picked up and preserved for burial with their owners. The practice of dyeing the beard was common among the Arabs and Persians; the former usually dyed it red, not only because dye of that color (being merely a paste of henna-leaves) was easily obtainable, but because it was an approximation to golden yellow, the color recommended by Mohammed, who hated black, the color preferred by the Persians. The Egyptians commonly shaved their beards, except in time of mourning; and an unkempt, neglected beard was also a sign of grief among the Jews. In Greece the beard was universally worn until the time of Alexander the Great, who ordered his soldiers to shave, that their enemies might not seize them by their beards in battle. Shaving was introduced among the Romans about the same time. Pliny says that Scipio Africanus was the first Roman who shaved every day. Subsequently, the first day of shaving (generally the twenty-second birthday) was regarded as the entrance upon manhood, and celebrated with great festivities. From the time of Hadrian to that of Constantine, the beard was again commonly worn. The ancient Germans, according to Tacitus, regarded a clean-shaven face as a sign of servitude, and the Lombards (Longobards) received their name from their long beards. The beard was commonly worn in France until the time of Louis XIII., when, the monarch being young and beardless, the fashion changed. French fashions in the matter have, in fact, usually followed that set by the monarch—an illustration of which is preserved in the English word 'imperial' for the little tuft on the chin. In like manner the loyal Spanish courtiers removed their beards on the accession of Philip V., who was unable to grow one. Peter the Great compelled shaving in Russia by positive enactment, imposing a tax on beards in proportion to the rank of the wearer. A similar tax was for a while imposed in England under Henry VIII. and Elizabeth; but fashion proved rebellious here, and the latter reign, with that of James I., was distinguished by a fantastic extravagance which clipped the beard into as many formal shapes as the old-fashioned box hedges. The Vandyke beard, familiar to us in the portraits of Charles I., characterized that period; but in the Eighteenth Century the smooth face became usual, so continuing until comparatively recent times. In fact, the wearing of a beard was regarded in the early part of the Nineteenth Century as a symbol of dangerous and revolutionary opinions, and as such was restricted by the police regulations of some European countries. The Roman Catholic clergy in modern times, although most of the mediæval

Popes wore beards, are obliged to shave—an exception being made in the case of missionary orders and of a few individuals who receive special permission for reasons of health. Those of the Greek Church have constantly worn full beards since the middle of the Ninth Century. As a general rule, the wearing of beards is prohibited by army regulations, while encouraged in the navy; but climatic conditions or assignment to exceptional duty may modify the general rule; as, e.g. in the Crimea, the British soldiers were permitted to wear beards.

Physicians recommend that the beard should be allowed to grow on the chin and throat in cases of liability to disease of the larynx or bronchia, because of the unavoidable removal of cuticle in shaving the throat. The beard itself is liable to the same diseases as the hair (q.v.), and to a peculiar disease called parasitic sycosis or 'barber's itch,' in which moderately red patches, covered with a purulent crust, appear on the skin. Consult Philippe, *Histoire philosophique, politique et religieuse de la barbe* (Paris, 1845). See Barber.

BEARD, George Miller (1839-83). A celebrated American neurologist. He was born in Montville, Conn., graduated at Yale, 1862, became a physician at the College of Physicians and Surgeons in New York in 1866, and devoted himself especially to nervous diseases. During the Civil War he served as assistant surgeon in the United States Navy, and later investigated the relation of the brain and nerves and made special studies in clairvoyance, animal magnetism, mind-reading, and spiritualism. He contributed to numerous medical journals, and published many books and pamphlets. His chief works are: *The Medical Use of Electricity* (1867); *Eating and Drinking* (1871); *Nervous Exhaustion, Neurasthenia* (1880); *American Nervousness* (1881); *The Psychology of the Salem Witchcraft Excitement of 1692* (1882); and *Seasickness, its Nature and Treatment* (1884). He collaborated with Dr. A. D. Rockwell on *The Case of Guiteau* (1882) and *The Medical and Surgical Use of Electricity* (1888).

BEARD, James Henry (1814-93). An American artist. He was born in Buffalo, N. Y., settled in Cincinnati, and became a successful portrait painter. In 1846 he exhibited in New York his first composition, "The North Carolina Immigrants," which gave him a national reputation. Among later works are "The Land Speculator," "The Long Bill," "Out All Night," "Don Quixote and Sancho Panza," etc. He painted portraits of Clay, John Quincy Adams, W. H. Harrison, Taylor, and many other public men. In 1870 he removed to New York, and in his later years devoted himself chiefly to animal painting.

BEARD, Richard (1799-1880). An American clergyman, born in Sumner County, Tenn. He began to preach in 1820, graduated at Cumberland College (Princeton, Ky.) in 1832, was professor of languages there from 1832 to 1838, and at Sharon College (Miss.) from 1838 to 1843. From 1843 to 1854 he was president of Cumberland College, and from the latter year professor of systematic theology at Cumberland University (Lebanon, Tenn.). He was the most distinguished theologian of the Cumberland Presbyterian denomination, and published two works of importance: *Lectures on Theology*, 3 vols. (1870), and *Why I Am a Cumberland Presbyterian* (1874).

BEARD, Thomas Francis (1842—). An American artist—better known as Frank Beard—born in Cincinnati, Ohio. He was educated in his native city, and served in the Civil War in the Seventh Ohio Regiment. Mr. Beard began to do illustrating work when a boy, and all the best magazines in the country have had contributions from his active pencil. He is also a popular lecturer, in which field he became widely known through his 'chalk talks.' In 1881 he was made professor of æsthetics at the University of Syracuse.

BEARD, William Holbrook (1825-1900). An American artist, brother of James H. Beard (q.v.). He was born in Ohio, and first became known as a portrait painter. After several years of travel and study in Europe, he settled in Buffalo. In 1860 he removed to New York, where he became a member of the National Academy in 1862. He soon acquired reputation as an animal painter, becoming very popular through his humorous and grotesque portrayal of rabbits, bears, monkeys, etc., which he endowed with human attributes, and in them burlesqued human foibles. Among them are "Bears on a Bender," "Dance of Silenus," "Flaw in the Title," "Darwin Expounding His Theories," and "Bulls and Bears in Wall Street." He published a book of sketches called *Humor in Animals* (1885), and a text-book, *Action in Art*.

BEARD MOSS. See Usnea.

BEARDSLEE, bērdz′lē, Lester Anthony (1836—). An American naval officer, born at Little Falls, N. Y. He graduated at the United States Naval Academy in 1856 was executive officer of the *Wachusett* in 1864 when that vessel captured the Confederate privateer *Florida*, at Bahia, Brazil, and in 1870 carried the first American flag through the Suez Canal. He was made a rear-admiral in 1895. From 1894 to 1897 he was commander of the United States forces on the Pacific Station. He discovered, surveyed, and named Glacier Bay, Alaska.

BEARDSLEY, bērdz′lĭ, Aubrey (1874-98). An English artist, born at Brighton. His first art work appeared in the *Pall Mall Magazine* in 1892, and he soon became widely known as an illustrator and a designer of book-covers and striking posters. His method was a fantastic juxtaposition of strong blacks and whites and highly elaborated systems of curves, and has considerably affected modern decoration. Among his numerous illustrations are those for Malory's *Morte d'Arthur*, Oscar Wilde's *Salome*, Pope's *Rape of the Lock*, and for several of Wagner's operas. In 1894 he became art editor of the *Yellow Book*. He wrote and illustrated *The Story of Venus* (1895) and *Under the Hill*, a novel (1896); and contributed posters, covers, and designs to the *Yellow Book*, the *Savoy*, and *Le Courrier Français*.

BEARDSLEY, Eben Edwards (1808-91). An American clergyman. He was born at Stepney, Conn., and graduated with high honors at Trinity College, Hartford. He was associated for a number of years with Saint Peter's Church, Cheshire, Conn., and with the Cheshire Episcopal Academy, and in 1848 was appointed rector of Saint Thomas's Church, New Haven, which, during his ministry, became one of the first churches in the State. He spent much of his time in historical research, and made valuable contributions to the ecclesiastical history of Connecticut. His writings include: *The History of the Episcopal Church in Connecticut from the Settlement of the Colony to the Death of Bishop Brownell in 1865* (New York, 1865); *Life and Correspondence of Samuel Johnson, D.D., Missionary of the Church of England in Connecticut, and First President of King's College, New York* (1874); *Life and Times of William Samuel Johnson, LL.D., First Senator in Congress from Connecticut, and President of Columbia College, New York* (Boston, 1876); *Life and Correspondence of the Rt. Rev. Samuel Seabury, D.D., First Bishop of Connecticut, and of the Episcopal Church in the United States of America* (1881).

BEARDSLEY, Samuel (1790-1860). An American jurist, born in Hoosic, N. Y. He filled several minor State positions, and was United States district attorney from 1823 to 1830. Afterwards he was a member of Congress (1831-36, and 1843-45); Attorney-General of the State (1837-38); became a judge of the State Supreme Court in 1844, and succeeded Judge Bronson as its chief justice in 1847.

BEARDS'TOWN. A city in Cass County, Ill., about 45 miles northwest of Springfield, on the Illinois River, and on the Chicago, Burlington and Quincy, and the Baltimore and Ohio Southwestern railroads (Map: Illinois, B 3). The Saint Louis Division of the Burlington Route has its machine, car, and repair shops here, and there are extensive cooperage-works, and manufactures of flour, lumber, window-screens, beer, etc. Ice-packing and the fishing industry also are of considerable importance. Among the more prominent features of interest are a fine park, a great railroad bridge, and a steel wagon-bridge, built in 1898 at a cost of $35,000. Settled in 1832, Beardstown was incorporated as a city under a general law of 1896. Its charter of that date provides for a mayor, elected biennially, and a city council. The water-works are owned and operated by the municipality. Population, in 1890, 4226; in 1900, 4827.

BEAR-FLAG WAR. See California, History; and Frémont, J. C.

BEAR'ING. In navigation and surveying, the direction of an object with respect to the position of some other, or to the direction of an assumed point or line. As observed from a ship objects are said to bear *ahead, astern, abeam* when they are directly ahead, directly astern, or at right angles to the ship's keel line (i.e. 90 degrees from ahead or astern). An object which bears midway between ahead and astern is said to *bear on the port* (or *starboard*) *bow* or *broad off the port* (or *starboard*) *bow;* if its bearing is midway between abeam and astern it bears *on the port* (or *starboard*) *quarter*, or *broad off the port* (or *starboard*) *quarter.* Intermediate bearings are expressed in points (32 in the whole circle, each 11¼ degrees) thus: 11¼ degrees from astern is *one point on the port* (or *starboard*) *quarter;* the same amount from abeam is *one point forward* (or *abaft*) the *port* (or *starboard*) *beam;* similarly, 11¼ degrees from ahead is *one point on the port* (or *starboard*) *bow.* In like fashion, the bearings may be one, two, or three points on bow; or quarter; or forward, or abaft, the beam. Four points from bow, stern, or beam is either *broad off the bow* or *broad off the quarter.* A ship is said to be *abreast* an object when it bears abeam; it is *abreast* another ship when the two are side by side and moving in the same direction. When an object lies across a certain direction it is said to be *athwart* it; as, a ship is lying *athwart the hawse* of another when she or her chain lies in a direction at right angles to that in which the other is swinging; any object extending across the ship lies *athwartship.* On board sailing vessels objects on the side from which the wind is blowing are said to be *to windward;* if forward of the beam (one or more points) *on the weather bow* or *forward of the weather beam;* similarly when abaft the beam. If on the side of the ship away from the wind the object is said to be *to leeward, on the lee bow*, etc. Bearings taken without regard to the vessel, but with respect to absolute terrestrial direction, are either *compass, magnetic*, or *true.*

Bearing, Compass. The angle between the compass needle and the direction of the object observed. See Compass.

Bearing, Magnetic. The angle between the magnetic meridian and the direction of the object observed. See Compass.

Bearing, True. The angle between the geographical meridian and the direction of the object observed. All bearings are measured in points (11¼ degrees each) or degrees. The designation of true and magnetic bearings, either in points or degrees, is the same as for compass-bearings, but the record of the bearing is followed by *p. c.* (i.e. per compass) for compass bearings; by *mag.* (i.e. magnetic) for magnetic bearings; and by *true* for true bearings; for examples, N. by E. (p. c.), N. 16° W. (p. c.), N. by E. (mag.), S. S. W. (true). See Compass.

In practical mechanics, bearing is the name given to the surfaces of contact between a moving-piece, such as a shaft or a connecting-rod and its support. For reciprocating motion the surfaces of the bearings must be perfectly rectilinear in the line of the motion. Such bearings are usually called slides, and examples are found in the crosshead guides of a locomotive, and also in most other forms of steam-engines. For rotary motion the bearing-surfaces must be surfaces of revolution; examples of such bearings are found in the hangers for mill-shafting, in the pivots of turntables, etc. The bearing-surface of the support is often made of special metal to reduce friction. For similar purposes the rotating-surface is often constructed to run on steel balls, or cylindrical or conical rollers held by the support. The bearings of a bicycle are familiar examples of ball-bearings, and both roller and ball bearings are used for motor-vehicle wheels. Some bearings are used in screw-jacks, many machine tools, elevators, etc., in which the moving part is threaded like a screw and the support is threaded like a nut. Such bearings allow rotary motion and reciprocating motion at the same time. The thrust-bearings of large steamship propeller shafts consist of a nut with incised threads engaging with collars on the shaft. These bearings differ from screw-bearings in that the threads are not spiral, but run straight around the nut and shaft, and so only rotary motion is possible. In machinery ball thrust-bearings are often employed. A roller thrust-bearing was made by the Ball-Bearing Company of Boston, Mass., in 1900, capable of carrying a thrust of 80 tons.

BEAR LAKE, Great. A lake in the northwestern part of Canada, the most northerly of that chain of fresh-water lakes—Huron, Superior, Winnipeg, Athabasca, Great Slave, Great Bear—which mark a continuous hollow in the middle of the North American continent (Map: Northwest Territories, E 1). Great Bear Lake, in latitude 65° to 67° N. and longitude 117° to 123° W., is irregular in shape, 150 miles long, and has a surface estimated at 14,000 square miles. Its height above the ocean is computed at 230 feet. It sends forth a river of its own name to the Mackenzie. The climate of this region is of course severe, and the surface of the lake sometimes remains frozen over for nine months of the year.

BEAR-LEADER. One who leads a tame bear by a chain and causes the animal to dance and otherwise to furnish popular entertainment. From this ancient practice came the term 'bear-leader,' now used jocularly to signify a discreet person who takes charge of a youth of rank on his travels to see the world, or who acts as *cicerone* to any celebrated individual.

BEAR MOUN'TAIN. A hill of the Stony Mountain range in Dauphin County, Pa., north of Harrisburg. It contains valuable beds of anthracite. It rises to a height of about 760 feet.

BÉARN, bā'ärn' (*Beneharnum* of the Middle Ages; from the Gallic *Benarni*). An ancient province of France, now forming the greater part of the Department of the Basses-Pyrénées. Béarn was a portion of Aquitania under the Romans, and after the downfall of the Roman Empire passed under the domination of the Franks. After the Tenth Century the country attained to great importance under a line of independent counts of the houses of Foix and Navarre. Its cities enjoyed extensive municipal rights from a very early time. Jeanne d'Albret, Queen of Navarre and Béarn, was the mother of Henri II., who ascended the French throne as Henri IV. By his enemies he was derisively called the Béarnois. When he became King, Béarn virtually became a part of France, but was formally incorporated with it only in 1620 by Louis XIII. Consult Bordenave, *Histoire de Béarn et Navarre* (Paris, 1873).

BEAR RIV'ER. A river which rises in Utah, in the Uintah Mountains, and flows nearly north. It enters Wyoming, reënters Utah, again crosses into Wyoming, and, taking a northwest course, enters Idaho; but at Soda Spring, Bannock County, it turns to the south, and, reëntering Utah, empties into Great Salt Lake (Map: Utah, B 1). It is about 400 miles long, and is noted for the many soda, magnesia, and other mineral springs to be found on its banks.

BEAR'S GREASE, or **BEAR'S OIL.** A name under which numerous preparations or pomades for strengthening and promoting the growth of the hair are sold. These preparations are usually made from beef marrow, hog's lard, veal fat, palm oil, or spermaceti, with some scenting ingredient to give them an agreeable perfume. Their manufacture and sale is based upon the belief that genuine bear's grease or oil has great efficacy in nourishing and promoting the growth of the hair.

BEAR STATE. Popular name for Arkansas. See States, Popular Names of.

BEAS, bē'ās (anciently, *Hyphasis*). One of the five rivers of India, which give name to the *Punjab*, or 'land of five waters.' It rises on the verge of the Rohtung Pass of the Himalayas, in latitude 32° 34′ N. and longitude 77° 12′ E., its source being 13,200 feet above the sea-level. After a course of about 300 miles, it joins the Sutlej, 35 miles to the south-southeast of Amritsar.

BEAT. The motion of the hand and arm, or baton, by which the conductor of a chorus or orchestra indicates the time and rhythm of a musical composition, and insures perfect unanimity of performance on the part of the singers or players. In ancient times the leader used his foot to mark the time, and this person, called by the Greeks *coryphæus*, and by the Romans *pedicularius*, wore sandals of wood or metal to make his beat more emphatic. Leaders who marked the time by clapping their hands were called *manaductores*. The etiquette of modern musical performance demands that the conductor shall perform his task as inaudibly and inconspicuously as possible; but this refinement is of recent date; for Rousseau, in 1768, writing of the Paris Opera, declares that the listener is "shocked by the continual and disagreeable noise made by him who beats the measure."

With the Greeks the up beat (*arsis*) indicated the accented, and the down beat (*thesis*) the unaccented, part of the measure. In modern time-beating this is reversed. The first note or count of the measure, which has always the strongest accent, is marked by a downward motion of the hand or baton. In duple time, with two beats to the measure, this down beat is followed by an upward beat on the unaccented count. In triple time, with one strong and two weak beats, the first beat is down, the second to the right, and the third upward. In quadruple time, with four beats, the usual order is down, to the left, to the right, and up.

BEA'TA BEA'TRIX. A portrait by Rossetti in the National Gallery, London. Its subject is Dante's Beatrice, and the model was the artist's wife.

BEAT'IFICA'TION (Lat. *beatus*, blessed + *facere*, to make). A solemn act in the Catholic Church, by which the Pope, after scrutinizing the life and services of a deceased person, pronounces him blessed. After this he may be worshiped in a specified portion of the church, and the act holds out the prospect of future canonization, which entitles him to general worship in the Church Universal. Beatification was introduced in the Twelfth Century. It may be regarded as an inferior degree of canonization (q.v.).

BE'ATIF'IC VIS'ION (Lat. *beatificus*, from *beatus*, happy + *facere*, to make; Lat. *visio*, from *videre*, to see). The direct vision of God, constituting the bliss of angels and of men in heaven. A term of Roman Catholic theology. The Council of Florence (A.D. 1439) defined: "The souls of those who, after receiving baptism have incurred no stain of sin whatever, or who, after incurring such stain, have been purified in the body or out of the body, . . . are at once received into heaven and clearly see God Himself as He is, in Three Persons and One Substance; some, however, more perfectly than others, according to the diversity of their merits." Such vision is supposed to have been enjoyed by Moses (Ex. xxxiii. 11) and by Paul (II. Cor. xii. 4) before their death, but it is not ordinarily given in the flesh. Hence the loose application of the term to such visions as those of Saint Catherine is improper. It is not taught that the saints have a perfect knowledge of God, for this is impossible to finite creatures. But they have such knowledge of Him as He wills, and see in Him all the facts concerning His creatures which He wills to communicate. Thus, it is said, they can hear prayers addressed to them, though not omniscient, because enabled by the beatific vision. Consult Addis and Arnold, *Catholic Dictionary* (New York, 1893).

BEAT'ING THE BOUNDS. The popular expression in England for the periodical surveys or perambulations by which the ancient boundaries of parishes are preserved. Formerly the ceremony took place annually, but now it is observed less often. The procedure, according to common custom, is in this wise: On Holy Thursday or Ascension Day, the clergyman of the parish, the parochial officers and other parishioners, together with the boys of the parish school, headed by their master, go in procession to the parish boundary. It is their duty to trace very carefully every foot of the boundary, even if ladders must be used in climbing over buildings and other obstructions. It is desirable to have as many boys as possible. At each 'boundary-mark' a halt is made, and the boys beat the mark with peeled willow wands to impress its location on their memories. The beating was not confined to the above performance of the boys, but where it was desired to preserve evidence of particular boundaries, the singular expedient was used of whipping the boys themselves on the spot, or one of them, who received a stated fee for the permitted castigation out of the parish funds—it being thought that the impression made on the memory was thus more likely to be lasting.

The custom is a Teutonic institution, taking its rise in the 'procession' of the ancient mark or township. This procession was led by the priest who performed sacrifices on altars placed near the borders. When the Germans were converted, the Christian priest took the place of the pagan, and the heathen sacrifice was supplanted by the mass. The procession is still maintained in Bavaria, as also in Russia. Similar duties were performed by the appointed 'perambulators' in the New England Colonies, and by the 'processioners' in early Virginia. In English law the correct legal term for beating the bounds is perambulation (q.v.). Consult: Toulmin Smith, *The Parish* (London, 1857); Brand, *Popular Antiquities* (London, 1873-77); Lysons, *Environs of London*, Vol. II. (London, 1792-96); Hone, *Every Day Book* (London, 1826-31); Steer, *Parish Law* (London, 1887); Grimm, *Rechtsaltertümer* (Göttingen, 1854); Laveleye, *Primitive Property* (Eng. trans. London, 1878); Wallace, *Russia* (New York, 1881); and, in general, Howard, *Local Constitutional History*, Vol. I. (Baltimore, 1889).

BEAT'ITUDES (Lat. *beatitudo*, blessing). The name frequently given to the opening clauses, nine in number, of the Sermon on the Mount, each of which begins with the word 'Blessed.' See Matt. v. 3-11.

BEATON, bē'ton, *Scot. pron.* bā'ton, or BETHUNE, DAVID (1494-1546). A cardinal and primate of Scotland, noted for his opposition to the Reformation in that country, and for his persecution of Protestants. He was born in Fife and became a student at Saint Andrews University, afterwards studying canon and civil law in Paris. After filling several minor positions with ability, he was appointed Lord Privy Seal in 1528, and in 1533 went as Ambassador to France. On the recommendation of the French King, Pope Paul III. in 1538 made Beaton cardinal, and in 1539, at his uncle's death, he became Archbishop of Saint Andrews. On the death of James V., December 14, 1542, after the disastrous overthrow of the Scots at Solway Moss, Beaton produced a forged will of the late King, appointing himself, with three others, Regent of the kingdom during the minority of the infant Queen, Mary. The nobility, however, rejected the fictitious document, and elected the Earl of Arran regent, who then professed the Reformed faith. The following month, Beaton was arrested and imprisoned, accused, among other charges, of a design to introduce French troops into Scotland, in order to stop the negotiations then in progress with Henry of England for a marriage between the young Prince of Wales, afterwards Edward VI., and the infant Queen of Scots. He was soon after liberated, and reconciled to the Regent, whom he induced to abandon the English interest, and publicly to abjure the Reformed religion. On the young Queen's coronation in 1543, Beaton was again admitted to the council and appointed Chancellor. He now renewed his persecution of the Reformers, and in January, 1546, accompanied by the Regent, he made a diocesan visitation of the counties under his jurisdiction, and punished with the utmost severity all the Protestants he could find. At Perth, a number of persons accused of heresy were banished from the city, others imprisoned; three men were cruelly hanged, and one woman drowned by his directions. During a provincial council of the clergy held in Edinburgh, at which he presided, he caused the celebrated evangelical preacher, George Wishart, to be apprehended and conveyed to the castle of Saint Andrews, where he was burned at the stake. Beaton and other prelates witnessed his sufferings from a window. The Lairds of Fife, friends of Wishart, determined to avenge him and secure their own safety by compassing the Cardinal's death. John Leslie, brother to the Earl of Rothes, his nephew Norman and Kirkaldy of Grange, entered the archiepiscopal palace by stealth, and, surprising the Cardinal in his bedroom, murdered him on May 29, 1546. Although a talented man, Beaton was arrogant, cruel, and immoral. He had six natural children. He married the three daughters into titled families, and one of his sons became a Protestant. Consult: Keith, *Catalogue of the Bishops* (Edinburgh, 1755, 1824); Spottiswood, *History of the Church of Scotland* (London, 1655; Edinburgh, 1851); Chambers, *Biographical Dictionary of Eminent Scotsmen* (London, 1875); Burton, *History of Scotland* (Edinburgh, n.d., Index.)

BEATRICE, bē′à-trēs. A city and county-seat of Gage County, Neb., 40 miles south of Lincoln, on the Big Blue River, and on the Union Pacific, the Chicago, Rock Island and Pacific, the Burlington Route, and other railroads (Map: Nebraska, H 3). It contains a public library, a State Institute for the feeble-minded, and a fine court-house and Federal buildings. The city has excellent water-power and is the seat of extensive manufactures, particularly of flour and agricultural implements. Settled in 1859, Beatrice was incorporated as a town in 1871 and became a city two years later. The government is administered under a charter of 1901, which provides for a mayor, elected every two years, and a city council. The water-works are owned and operated by the municipality. Population, in 1900, 7875.

BEATRICE. A brilliant and witty character in Shakespeare's *Much Ado About Nothing.* She finally marries her male counterpart, Benedick, in spite of herself.

BEATRICE CENCI, bā′à-trē′chȧ chĕn′chē. A Roman lady of the Sixteenth Century, and the heroine of Shelley's tragedy *The Cenci;* also the subject of a celebrated painting by Guido Reni, in the Palazzo Barberini, Rome.

BEATRICE, Joanna. The vicious heroine of Middleton's play, *The Changeling,* who persuades De Flores to murder a persistent lover for whom she does not care. She is finally murdered herself by De Flores.

BEATRICE PORTINARI, pōr′tē-nä′rē (1266-90). The daughter of a Florentine noble, Folco Portinari, and wife of Simone dei Bardi, identified by Boccaccio with Beatrice of Dante's poems. Dante first saw her when she was but nine years old, and but seldom afterwards; yet his passion for her forms the theme of his *Vita Nuova,* and after her untimely death his love assumed a more and more mystic form, and he made her the central symbol of his *Divina Commedia,* the personification of divine truth. The identity of Beatrice and her allegorical significance in the *Divina Commedia* have been made the subject of quite an extensive literature. Consult Scartazzini, "Beatrice," in *Enciclopedia Dantesca* (Milan, 1865-67).

BEATRIX, bē′à-trĭks. (1) A character in Dryden's comedy, *An Evening's Love; or, the Mock Astrologer.* (2) Beatrix Esmond, a cousin to Henry Esmond in Thackeray's novel of that name: a beautiful, vain, ambitious woman, who also appears in the sequel, *The Virginians,* as Madame de Bernstein. Henry Esmond was in love with her, and for her sake engages in the plot to bring back the Stuarts, on the death of Queen Anne.

BEATRIX (bē-ā′trĭks) **AN′TELOPE.** An Arabian gemsbok (*Oryx beatrix*), resembling the beisa (q.v.), but without black markings on the hind quarters. See Oryx.

BEATTIE, bā′tē, James (1735-1803). A Scottish poet and moral philosopher. He was born October 25, 1735, at Laurencekirk. He studied at Marischal College, Aberdeen, where he acquired a high reputation as a classical scholar. In 1758 he was appointed one of the masters of the grammar school in that city, and in 1760 professor of moral philosophy in Marischal College. Ten years afterwards appeared Beattie's famous *Essay on Truth,* an attempt to refute the skepticism of Hume. The book, which now reads like an invective against Hume, at once made Beattie conspicuous as a defender of orthodoxy. He was introduced to George III., given a pension of £200, and offered a living in the Anglican Church and the chair of moral philosophy at Edinburgh. Though his head was slightly turned by this success, he declined all these offers. The essay is of little importance in the history of philosophy, and has consequently been long neglected. In 1771 appeared the first part of *The Minstrel,* written in the Spenserian stanza, and in 1774 the second part. It is a delightful poem. It overflows with true poetical emotion, and is rich in picturesque descriptions, while the versification has a quiet fullness of melody. The poem describes "the progress of a poetical genius born in a rude age, from the first dawning of fancy and reason till that period at which he may be supposed capable of appearing in the world as a minstrel." Beattie intended to add a third part, but circumstances prevented his doing so. In 1776 he published a series of essays on poetry, music, etc.; in 1783, *Dissertations Moral and Critical;* in 1786, *The Evidences of the Christian Religion Briefly and Plainly Stated;* and in 1790-93, *The Elements of Moral Science;* all of which works are written in a clear and elegant style, and with a high appreciation of whatever is beautiful and good. He died August 18, 1803. Consult Forbes, *Life and Writings of James Beattie* (Edinburgh, 1824).

BEAU BRUM′MELL. See Brummell, George B.

BEAUCAIRE, bō′kâr′ (anciently, Lat. *Ugernum;* later *Bellum Quadrum,* beautiful square). A well-built commercial town of France, on the right bank of the Rhône, in the Department of Gard, opposite Tarascon, with which it is connected by a suspension bridge. The harbor is commodious for vessels, which enter it by a canal communication with the Mediterranean, and thus avoid the sand-banks at the mouths of the Rhône. The importance of Beaucaire lies in its great fair, established, it is said, as early as the Twelfth Century. It is held annually, beginning July 22, and lasts six days. In former times, when this fair was free from duties, it was attended by merchants and manufacturers from almost all parts of Europe, from the Levant, and even from Persia and Armenia; but the numerous imposts demanded since 1632, foreign wars, and the competition of Marseilles, Lyons, and other large places, reduced the traffic of Beaucaire, which sank still lower in the days of the Revolution. The fair, however, is still held in much repute, 50,000 persons sometimes attending it. The chief articles of commerce are silks, wines, oil, almonds, and other fruits, spices, drugs, leather, wool, and cotton. Population, in 1896, 9000.

BEAUCAIRE, Monsieur. The hero of a dramatic story of the same title by Booth Tarkington (1900), which relates the adventures of a French prince moving incognito in fashionable English society in the Eighteenth Century. The story was dramatized in 1901.

BEAUCHAMP, bō'shäN', Alphonse de (1767-1832). A French historian and publicist. He was born at Monaco; received his education in Paris, and entered the Sardinian military service. In 1792 he suffered imprisonment for refusing to bear arms against his country, but escaped to France, and under the Directory obtained a situation in the office of the Minister of Police, and had the surveillance of the press. Here he commenced his *Histoire de la Vendée et des Chouans* (3 vols., Paris, 1806), which depicted the cruelties of the Fouché régime. As this work displeased the Emperor, Beauchamp was banished to Rheims, but he was recalled in 1811, and again received a subordinate appointment. Under the Restoration, he received a pension and wrote for the *Moniteur* and the *Gazette de France*. Among his works are the *Histoire du Brésil* (Paris, 1815); *Histoire du Pérou* (Paris, 1807); *Vie de Jules César* (Paris, 1821); *Vie de Louis XVIII.* (Paris, 1821). The *Mémoires* of Fouché (Paris, 1828-29) have also been ascribed to him.

BEAUCHAMP, Richard de. See Warwick, Richard de.

BEAUCHAMP, bēch'am, William Martin (1830—). An American ethnologist and clergyman, born in Coldenham, Orange County, N. Y. He graduated at the DeLaney Divinity School, and from 1865 to 1900 was rector of Grace Episcopal Church in Baldwinsville, N. Y. In 1886 he was made examining chaplain for the diocese of Central New York. He has made much valuable archæological research, particularly concerning the Iroquois Indians, and has a large collection of Indian relics. He was detailed in 1889 by the United States Bureau of Ethnology to survey the Iroquois territory in New York and Canada, and prepared a map which indicates the location of all the known Indian sites in that region. An enlargement of this map was published in his *Aboriginal Occupation of New York* (1900). His other works are: *The Iroquois Trail* (1892): *Indian Names in New York* (1893); *Aboriginal Chipped Stone Implements of New York* (1897); *Earthenware of the New York Aborigines* (1900); *Wampum and Shell Articles Used by the New York Indians* (1901); and *Bone and Horn Articles Used by the New York Indians* (1902).

BEAUCHAMPE, or The Kentucky Tragedy. A sequel to William Gilmore Simms's *Charlemont* (1842).

BEAUCLERK, bō'klärk, Topham (1739-80). A gentleman who figures in Boswell's *Johnson* as the intimate and friend of the lexicographer. He was the only son of Lord Sydney Beauclerk. During his friend's last illness Johnson said he would "walk to the extent of the diameter of the earth to save Beauclerk," and after his death wrote to Boswell: "Poor dear Beauclerk. . . . His wit and his folly, his acuteness and maliciousness, his merriment and reasoning, are now over. Such another will not often be found among mankind." In 1768 Beauclerk married Diana, daughter of the second Duke of Marlborough, two days after her divorce from Lord Bolingbroke. See G. Birkbeck Hill, *Dr. Johnson, His Friends and His Critics* (1878).

BEAUFORT, bō'fērt. A town, seaport, and the county-seat of Carteret County, N. C., at the mouth of Newport River, 145 miles southeast of Raleigh; reached by the Atlantic and North Carolina Railroad (Map: North Carolina, F 3). It is of increasing popularity as a summer resort, and has a good harbor, the entrance to which is protected by Fort Macon. Its principal industries are fishing, and the manufacture of oil and scrap. Population, in 1890, 2007; in 1900, 2195.

BEAUFORT, bū'fērt. A town and county-seat of Beaufort County, S. C., on an inlet known as the Beaufort River, which connects with Port Royal Sound, one of the finest harbors in the State (Map: South Carolina, D 4). It is equidistant by rail from Charleston, S. C., and Savannah, Ga. Beaufort is famous for the production of long-staple, or sea-island, cotton, is a centre of the phosphate and fertilizer trade, and has large exports also of cotton, lumber, rice, and sweet potatoes. It contains a national cemetery. Beaufort was first incorporated in 1803, and at present is governed under a charter of 1892 by an executive, 'intendant,' who is elected every two years, and a town council. Population, in 1890, 3587; in 1900, 4110.

Founded in 1711, Beaufort is, next to Charleston, the oldest settlement in the State. Near here, in 1664, French Huguenots under Captain Ribault built a fort, which in 1665 was taken by the Spanish under Menendez, who massacred all the garrison. In 1686 Lord Cardross attempted to found a town here, but his settlement was immediately broken up by the Spanish from Saint Augustine. The place was very prominent throughout the colonial history of the State, and for some years before the Civil War was a popular health resort for Southern planters. Near here, on February 9, 1779, an American force under General Moultrie defeated a detachment of English troops under Prevost. Consult: Parkman, *Pioneers of France in the New World* (Boston, 1865), and references in McCready, *History of South Carolina.*

BEAUFORT, bō'fôr', François de Vendôme, Duc de (1616-69). A French naval officer, the grandson of Henry IV. He was a conspirator with Cinq-Mars against Richelieu, and fled for safety to England. Under Louis XIV. he was in a conspiracy against Mazarin, and was imprisoned. He escaped in 1648, became a leader of the Frondeurs, and was the idol of the Parisian populace, who called him 'King of the Markets,' on account of the coarseness of his language. He killed the Duke of Nemours, his brother-in-law, in a duel; afterwards made his peace with the Court, and was appointed to command the navy. In 1664 and 1665 he defeated the African corsairs, and in 1666 led the fleet which was to aid the Dutch against England. He was killed in 1669 while assisting the Venetians, who were besieged by the Turks in Candia.

BEAUFORT, bū'fērt *or* bō'fērt, Henry (? 1447). An English cardinal. He was an illegitimate son of John of Gaunt, Duke of Lancaster, and was educated and spent most of his youth at Aix-la-Chapelle. After holding various offices in England, he became Bishop of Lincoln in 1398, and chancellor of the University of Oxford in 1399. After his half-brother, Henry IV., became

King, Beaufort was made Chancellor of England, in 1403. But he resigned this office when he removed to Winchester, of which he was made bishop in 1405. For the next forty years he was prominent in every political movement in England. He was twice again chancellor, and as such depended for his strength upon the support of Parliament. He amassed enormous wealth, and lent it freely to the King when the royal treasury was empty. On two occasions his loans to the State amounted to over £20,000, an extremely large sum for any individual at that time. He was present at the Council of Constance, and voted for the election of Pope Martin V., by whom he was subsequently made a cardinal and sent as legate to Germany, Hungary, and Bohemia, to organize a crusade against the Hussites. This undertaking failed. The Cardinal soon after fell under the displeasure of the Pope, because he used in France an English army raised for the Crusades. In 1431 Beaufort conducted the young King, Henry VI., to France, and crowned him in Paris as King of France and England. Here he also endeavored, but vainly, to reconcile the Duke of Bedford, Regent of France, with the offended Duke of Burgundy. Cardinal Beaufort died at Winchester, April 11, 1447. Consult Stubbs, *Constitutional History of England*, Vol. III. (Oxford, 1891).

BEAUFORT, bū′fērt *or* bō′fērt, Margaret, Countess of Richmond and Derby (1441-1509). She was the daughter of the first Duke of Somerset, and became the wife of the Earl of Richmond (half-brother of Henry VI.), and by him mother of Henry VII. of England. Left a widow, she was successively wife of Sir Henry Stafford and of Thomas, Lord Stanley, afterwards the Earl of Derby. She endowed Christ's and Saint John's colleges at Cambridge. Consult: Halsted, *Life of Margaret, Countess of Richmond* (1839), and Cooper's *Memoir*, edited by Mayor (1874).

BEAUFORT SCALE. An arbitrary scale of 12 numbers, for use in recording the apparent strength of the wind, introduced into the British Navy by Admiral Beaufort about 1805, and now very generally used by all navigators. Originally the observer was supposed to know the general effect of the wind upon his own vessel or the standard vessel imagined by Admiral Beaufort—namely, the full-rigged man-of-war—but these vessels are not now built, although the wind terms retain their old significance; therefore, the latter are retained, but the numbers expressing the equivalent velocities in miles per hour, as they result from modern investigations, are added in the following table:

Beaufort Scale No.	Designation of Wind	Approximate Wind Velocity in Miles Per Hour
0	Calm	3 or less
1	Light air	8 "
2	Light breeze	13 "
3	Gentle "	18 "
4	Moderate "	23 "
5	Fresh "	28 "
6	Strong "	34 "
7	Moderate gale	40 "
8	Fresh "	48 "
9	Strong "	56 "
10	Whole "	65 "
11	Storm	75 "
12	Hurricane	90 "

BEAUGARD, bō′gärd. The hero of Otway's *The Soldier's Fortune* and *The Atheist*.

BEAUHARNAIS, bō′är′nä′, Alexandre, Vicomte de (1760-94). A French statesman and soldier. He was born in the Island of Martinique, and served under Rochambeau in the American War of Independence. He embraced the cause of the Revolution, was a member of the Constitutional Assembly, and on the night of the fourth of August, 1789, voted for the abolition of feudal privileges. He served with distinction on the Committee for Military Affairs, and presided over the National Assembly when the news came of the flight of Louis XVI. "Gentlemen," he said, "the King has run away. We will proceed with the order of the day." He fought bravely in the north, especially at Mons, but resigned his command in 1793, in accordance with the law which excluded the nobility from the army. After he had lived for some time in retirement, his enemies brought forth the charge that, as commander of the Army of the Rhine, he had been the cause of the loss of Mainz. He was put on trial during the Reign of Terror, convicted, and guillotined, July 23, 1794. His widow, Joséphine, married Napoleon Bonaparte, who adopted Eugène and Hortense, son and daughter of Beauharnais.

BEAUHARNAIS, Eugène de (1781-1824). A French general. He was the son of the Vicomte de Beauharnais, and after his mother's marriage with Bonaparte he accompanied him in the expedition to Egypt and in his campaigns in Italy. He rapidly rose to the highest military rank, and in 1805, after the erection of the imperial throne, he was made a Prince of France and Viceroy of Italy. In 1806 he married the Princess Amalie Augusta of Bavaria, and not long afterwards was created Prince of Venice, and declared by Napoleon his adoptive son and heir to the Kingdom of Italy. Although his political power was much limited, he conducted himself in Italy with much prudence, energy, and moderation, although he considered himself bound to carry out the decrees of the Emperor. His military talents were displayed in the wars against Austria, and in the retreat from Moscow the preservation of the French Army from total destruction was ascribed to the skill and resolution of the Viceroy and of Ney. The victory of Lützen (1813) was decided by his conduct. From this scene of war, Napoleon sent him to Italy, which he ably defended against Austria and Murat, who had deserted the cause of the French Empire. In the affairs of the Hundred Days he took no part; and in the Treaty of Fontainebleau and at the Congress of Vienna large sums were granted to him in compensation for his Italian possessions, with which he purchased from his father-in-law the landgraviate of Leuchtenberg and the principality of Eichstädt. His eldest son, Charles Augustus Eugène Napoleon, Duke of Leuchtenberg, married the Queen Maria of Portugal, on January 25, 1835, but died on the 18th of March of the same year. Another son, Max Eugène Joseph Napoléon (died 1852), who succeeded his brother as Duke of Leuchtenberg, married the Grand Duchess Maria of Russia. Consult *Mémoires du Prince Eugène de Beauharnais* (Paris, 1858-60).

BEAUHARNAIS, Hortense Eugénie. See Bonaparte.

BEAULIEU, bô'lyẽ', Jean Pierre (1725-1819). An Austrian general, born at Namur. He entered the army in 1743, served in the Seven Years' War, being present at Breslau and Leuthen, and in 1789 took an active part in the suppression of the Belgian insurrection. As major-general he increased his military reputation by his gallant services in the campaigns against the French in Belgium. In 1796 he was appointed commander of the forces in Italy, but after the defeat by Bonaparte at Lodi he relinquished the command to Wurmser.

BEAUMANOIR, bō'mä'nwär', Sir Lucas de. The head of the Knights Templars in Scott's *Ivanhoe*, who arraigns Rebecca for sorcery.

BEAUMANOIR, bō'mä'nwär', Philippe de Rémi, Sire de (c.1250-96). A French jurist and poet. From 1279-82 he was *bailli* at Clermont, and from 1293 to his death at Senlis. His chief work, *Coutumes de Beauvoisis*, is highly commended by Montesquieu. It is the masterpiece of mediæval judicial literature; the main source of knowledge, not only of old French law, but of the society of the Thirteenth Century. The best edition is that of Beugnot (1842). Among his poems, the "Manekine," "Jehan et Blonde," and a "Salut d'amour" are the most noteworthy.

BEAUMARCHAIS, bō'mär'shä'. A name assumed by Pierre Augustin Caron (1732-99), the most important French dramatist of the Eighteenth Century, though he wrote but two really successful plays, *Le barbier de Séville* (1775) and *Le Mariage de Figaro* (1784). He was born in Paris, the son of a watchmaker, and was educated to his father's trade. He early developed a marked taste for music and sufficient proficiency to become music-master to the daughters of Louis XV. He turned this position to good account in speculations. In 1764 he made a journey to Spain to protect or vindicate his sister, who had been abandoned by her betrothed, Clavigo. His account of this mission in his *Mémoires* suggested the drama *Clavigo* to Goethe. He brought from Madrid a knowledge of things Spanish that was later of much use to him. He now turned to the drama, wrote *Eugénie* (1767), a fairly successful domestic drama, and *Les deux amis*, a decided failure in the pathetic vein. Meantime he had become engaged in financial speculations that led to lawsuits, and these led to a series of *Mémoires*, appeals to the public that are among the most vigorous, audacious, clever, and witty polemics in literature. Their attack on judicial injustice gave them a universal interest. They were eagerly read, and deepened the discontent with the existing state of society that was to culminate in the Revolution. Beaumarchais thus became a political personality. He was confidentially employed by Louis XV. and later by Louis XVI., but before this he had snatched a sensational dramatic triumph out of failure by rearranging a comic opera into a five-act comedy—his *Barbier de Séville* (1775), Spanish in scene, but essentially French at the heart; the most famous comedy of the century, save only its sequel from the same hand. It is simple, lively, ingenious, effective, and it contains one of the strongest-drawn characters of dramatic literature—Figaro, an incarnation of the new democracy.

Beaumarchais now engaged in furnishing the American revolted colonists with supplies, and acquired a pecuniary claim against the United States that remained long unsettled. His restless spirit also projected a complete edition of Voltaire, and he prepared a sequel to the *Barbier*, *Le mariage de Figaro*, so daringly democratic and revolutionary that it received the advertisement of a prohibition which so whetted public curiosity that when at last it was licensed, three persons were crushed to death in seeking entrance to the National Theatre (Théâtre Français, 1784). Here the wit is keener, the action swifter, the social satire more mordant than in the *Barbier*. Figaro, the light-hearted, versatile, shrewd scapegrace, was furnishing a social solvent that would disintegrate society and invite the Revolution. Beaumarchais had probably no more serious purpose than delight in his own wit. "He wished to fire a squib and he exploded the magazine." These comedies mark, in dialogue, construction, and intrigue, the high-water mark of the century. If they err, it is in the monotony of their brilliancy. The tradition of their unparalleled success gave models to Hugo and Dumas and inspired the operas of Rossini and Mozart. Beaumarchais did nothing more of significance. An opera libretto, *Tarare* (1777), is a trifle. A heavy melodrama, *La mère coupable* (1790), vainly seeks to recall *Figaro*. Then Beaumarchais fled from the Terror to Holland. He returned in 1796, and left at death a comfortable fortune that he had managed to save from the wreck of the Revolution. Beaumarchais's works are edited by Gudin (7 vols., 1809), by Furne (6 vols., 1827), and by Moland (1874). Consult also Loménie, *Beaumarchais et son temps*, 4th ed. (trans. by Edwards, London, 1856); Lintilhac, *Beaumarchais et ses œuvres* (Paris, 1887); Gudin de la Brenellerie, *Histoire de Beaumarchais* (ed. Tourneaux, Paris, 1886); Lescure, *Eloge de Beaumarchais* (Paris, 1887); Bonnefon, *Etude sur Beaumarchais* (Paris, 1887); and Hallays, *Beaumarchais* (Paris, 1897).

BEAUMARIS, bō-mâr'ĭs (Fr. *beau marais*, beautiful marsh). A seaport and chief town of the Island of Anglesey, North Wales, on the west side of the picturesque bay of Beaumaris, near the north entrance to the Menai Strait, 3 miles north of Bangor, and 239 miles northwest of London (Map: Wales, B 3). It is a modest little watering-place, with excellent sea-bathing. It has picturesque covered ruins of an ancient castle, one of the three (Conway and Carnarvon being the other two) castles in Wales built by Henry de Elreton, the famous architect of Edward I. Population, in 1891, 2200; in 1901, 2300. Beaumaris is in steamship communication with Liverpool.

BEAUMONT, bō-mŏnt'. A city and county-seat of Jefferson County, Tex., 83 miles east by north of Houston, on the Neches River and on the Texas and New Orleans, the Gulf, Beaumont and Kansas City, the Sabine and East Houston, and other railroads (Map: Texas, G 4). The accessibility of vast forests has contributed materially to the city's development as one of the greatest lumber centres of the South, the transportation facilities afforded by the railroads being augmented by the water route through Sabine Pass. Shingles, live stock, hides, and ice also are shipped; and the manufactures include sawed and planed lumber, largely cypress shingles, foundry and machine-shop products, cars, furniture, ice, brick, tile, etc. Oil, discovered in extraordinary quantity, has occasioned a great advance in real estate, with the projection of a number of new industrial establishments, and a corresponding exploitation of the possibilities of the city. Population, in 1890, 3296; in 1900, 9427.

BEAUMONT, bō′mŏnt, *formerly* bū′mŏnt, Francis (1584-1616). An English poet and dramatist. **FLETCHER**, John (1579-1625). An English poet and dramatist. These writers were so closely associated in their lives and labors that their names have become indissolubly united. Francis Beaumont was the third son of Francis Beaumont, one of the justices of the common pleas. He was born at Grace-Dieu, Leicestershire, in 1584. When 12 years of age he became a gentleman commoner of Broadgates Hall (now Pembroke College), but he left Oxford without taking a degree. In 1600 he was admitted a member of the Inner Temple. An expansion of one of Ovid's legends (1602) has been attributed to him. When about 19 years of age he became the friend of Ben Jonson, and wrote commendatory verses to some of his dramas. He became acquainted with Fletcher, probably in 1606; and they lived in the same house till Beaumont's marriage in 1613 to Ursula, daughter and coheiress of Henry Isley, of Sundridge, in Kent, by whom he had two daughters. He died March 6, 1616, and was buried in Westminster Abbey.

John Fletcher was born in 1579. His father, Richard Fletcher, a clergyman, was at that time incumbent of Rye, in Sussex; thereafter he was appointed Dean of Peterborough, and attended Queen Mary on the scaffold, whose last hours he embittered with irrelevant exhortation. On his elevation to the See of London, he married a second time, and thereby incurred the disfavor of the Virgin Queen. A John Fletcher, of London, who is assumed to be the dramatist, entered Bene't College, Cambridge, on October 15, 1591. It is uncertain how long this John Fletcher remained at the university, or whether he took a degree. The *Woman-Hater*, produced in 1607, is the earliest play of our author. It is not known precisely in what circumstances Fletcher passed his life. He asserts his independence in some verses introductory to *The Faithful Shepherdess*, published about 1610, yet he wrote more rapidly than most men then writing for bread. Waiting in London, it is said, for a new suit of clothes as he was about to go into the country, he caught the plague, and died (1625), and was buried in the Church of Saint Saviour.

The works of Beaumont and Fletcher comprise in all fifty-four plays (according to Fleay); but it is difficult to allocate, in any satisfactory manner, the parts written by each. A good deal, however, has been accomplished by the application of metrical tests. In some of the plays other hands have been traced, especially Massinger's. And certain passages in *The Two Noble Kinsmen* are by Shakespeare. The best work of this famous collaboration is represented by *Philaster* (mostly Beaumont's), the tremendous *Maid's Tragedy* (in which Beaumont's genius is dominant), and *The Faithful Shepherdess* (mostly Fletcher's), a beautiful pastoral drama, which furnished some hints to Milton for his *Comus*, and to Keats for his *Endymion*. Beaumont and Fletcher are the cleverest, gayest gentlemen. They rarely sound the deep sea of passion, but rather play over its surface. They have little power of serious characterization, and their numerous creations are seldom consistent; but they say the most clever and pleasant things. Morally, little can be said in their praise. No audience of the present day could sit out the representation of their purest plays. Some of the impurest are almost beyond conception, yet there is always an air of good breeding about them. The songs distributed through their plays almost equal Shakespeare's in sweetness and beauty. Consult: *Works*, with notes and memoir, ed. A. Dyce, 11 vols. (London, 1843-46); *Selected Plays*, in Mermaid Series (London, 1887); Macaulay, *Francis Beaumont: A Critical Study* (London, 1883). For exhaustive discussion of authorship of the various plays, Boyle, in *Englische Studien*, Vol. LXXIV. (Heilbronn, 1877-1901); id. in *New Shakspere Society* (London, 1880-86); also Fleay in the latter publication for 1874.

BEAUMONT, Sir George Howland (1753-1827). An English patron of art. He was born at Dunmore (Essex), and was educated at New College, Oxford, and from 1790 to 1796 sat in Parliament for Beralston. He made an extensive and fine collection of drawings and paintings, and was among the first properly to estimate the work of Wilkie, Landseer, and Gibson. He was one of the founders of the National Gallery, to whose collection he made valuable additions. As a pupil of Richard Wilson, he did some amateur painting in landscapes, two examples of which now hang in the National Gallery. He was a friend of Sir Joshua Reynolds, Coleridge, and Wordsworth, who dedicated to him many poems, notably *Elegiac Musings* (1830).

BEAUMONT, bō′môɴ′, Jean Baptiste Elie de. See Élie de Beaumont.

BEAUMONT, bō′mŏnt, *formerly* bū′mŏnt, William (1785-1853). An American surgeon, born at Lebanon, Conn. He is noted for discoveries in the processes and laws of digestion, made in watching the operations of the stomach in the case of Alexis Saint Martin. On June 6, 1822, Saint Martin, then supposed to be 18 years old, while at Mackinac, Mich., was accidentally shot, receiving the entire charge of a musket in his left side, the muzzle of the gun being about three feet from his body. This discharge tore away portions of his clothing, fractured two of his ribs, lacerated his lungs, and lodged in his stomach. Dr. Beaumont, who was then stationed at Mackinac as a surgeon in the United States Army, restored Saint Martin to health within a year, though the aperture made by the shot was never closed. Two or three years afterwards, Beaumont commenced a series of experiments upon the stomach of the young man, studying its operations and secretions, the action of the gastric juice, etc. These experiments he continued from time to time, his patient presenting the spectacle of a man enjoying good health, appetite, and spirits, with an opening in his stomach, through which the action of that organ could be satisfactorily noted from the exterior. Beaumont was the first to obtain the gastric juice from a living human being, and he demonstrated, beyond a doubt, its chemical properties and digestive powers. He published the result of his experiments in 1833. Afterwards he resigned from the army, and practiced medicine in Saint Louis, Mo., until his death.

BEAUMONTAGUE, bô-mŏn'tȧ-gû. A composition of iron borings, brimstone, pitch, sal ammoniac, rosin, and beeswax, which is used to fill up cracks and flaws in an iron casting, and so to give falsely an appearance of solidity. The ingredients are melted in a vessel over an open fire, and when cooled, are rolled into small balls. When used, these are broken up, and a bit is inserted into the flaw. A red-hot iron passed over it forces the beaumontague into the crevices of the faulty article, which, when finished, bears no trace whatever of having been dealt with in this way. This term is of English origin and is seldom used in the United States.

BEAUMONT DE LA BONNINIÈRE, bô'môN' *de* lȧ bô'nē'nyâr', GUSTAVE AUGUSTE (1802-66). A French publicist. In 1831 he and Tocqueville were commissioned by his Government to study the prison system of America. In 1840 he was elected deputy from Sarthe, and sided with the so-called dynastic opposition. After the February Revolution of 1848, he was returned as a member of the Constituent Assembly, and here maintained the character of a sincere but moderate Republican. He was appointed by Cavaignac Ambassador to England. One of the opponents of the coup d'état of 1851, he was imprisoned for some time in the fortress of Mont Valérien, and after regaining his liberty he lived in retirement. The writings on which his reputation rests are: *Du système pénitentiare aux Etats-Unis, et de son application en France* (2 vols., 1832—partly by Tocqueville); *Marie, ou l'esclavage aux Etats-Unis* (2 vols., 1835); and *L'Irlande, sociale, politique, et religieuse* (2 vols., 1839).

BEAU NASH. See NASH, RICHARD, and JERROLD, DOUGLAS.

BEAUNE, bôn. A town of the Department of Côte d'Or, France, in the ancient duchy of Burgundy, situated in a pleasant district on the river Bouzoise, about 23 miles south-southwest of Dijon (Map: France, L 4). The town is well built: it has a remarkable Thirteenth-Century parish church (Notre Dame), and a fine hospital, founded in 1443 by Nicholas Robin, Chancellor of Philip the Good, Duke of Burgundy. A communal college, a library of 50,000 volumes, and a museum are its chief public institutions. Its industries comprise distilleries, woolen-cloth and serge factories, and the manufacture of vinegar. Beaune is the chief seat of the wine trade of Burgundy, and gives its name to one of the best of the Burgundy wines. Beaune, as early as the Seventh Century, was a fortress under the name of Belna, and had its castle and its enceinte. Population, in 1896, 11,808.

BEAUNE, FLORIMOND DE (1601-52). A French mathematician, born at Blois. He contributed not a little to the development of Descartes's method in geometry, and his notes on Descartes's celebrated *Géométrie* have been incorporated in Schooten's edition of that book. The so-called 'Beaune's Problem' (which has been completely solved only by Jean Bernouilli), still given in the integral calculus, was for his time new and remarkable; it turns on the determination of the nature of a curved line from a property of its tangent. By contributions of this nature Beaune helped to pave the way for the integral calculus. He was also the first to treat systematically the question of superior and inferior roots of numerical equations (posthumous publication, 1659).

BEAUNEVEU, bô'n'-vẽ', ANDRÉ (?-c.1400). A Flemish sculptor, painter, architect, and illuminator. He was born in Hainault, and was the leader, with Sluter (q.v.), in the school of realistic sculpture in Flanders and northern France that anticipated the Italian Renaissance in humanistic study. After working in sculpture and painting at Valenciennes (1361-62) he went to Paris in 1364 and was made Royal sculptor to Charles V., whose mausoleum he executed, and besides those of Philip VI., John II., and Jeanne de Bourbon. After his return to Flanders in 1374 he worked at Malines (Communal Hall), made tombs at Courtrai, and a statue of the Virgin for the belfry of Ypres (1377). In 1390 he directed the work of sculpture and painting at the Duke de Berry's Château of Mehun. His finest remaining illuminations are in a psalter of the Bibliothèque Nationale in Paris (13,091 ff.), and the royal statues and other figures remaining from his royal tombs are remarkable for masterly force and intense realism.

BEAUREGARD, bō'rê-gärd', *Fr. pron.* bô'r'-gär' *or* bôr'gär', PIERRE GUSTAVE TOUTANT (1818-93). A Confederate general in the Civil War. He was born in New Orleans, graduated at West Point in 1838, and in the same year became second lieutenant in the engineer corps. He was engaged in important engineering work at Newport, Barataria Bay, and Fort McHenry until 1846, when he was sent to Mexico, and distinguished himself in the war there. He became captain of engineers in March, 1853; was engaged in the construction of fortifications at Mobile, Lake Ponchartrain, and New Orleans until 1860, and in November of that year was appointed superintendent of West Point, which position he resigned on February 20, 1861, to serve in the Confederate Army. He was immediately made brigadier-general and placed in command of Charleston, where, on April 12-13, by the bombardment of Fort Sumter (q.v.), he began the Civil War. He defeated the Federal General McDowell at the first battle of Bull Run on July 21, and on the next day was raised to the rank of general. At the battle of Shiloh on April 6-7, 1862, he was second in command during the first day, and on the death of Gen. A. S. Johnston assumed chief command, subsequently withdrawing to Corinth, where he remained, in the face of General Halleck's sluggard advance, until May 29. In 1863 he defended Charleston against the attacks of Admirals Dupont and Dahlgren, and in the following year was in command at Petersburg, Va., where he retarded General Grant's advance upon Richmond. He afterwards served with the Division of the West, and surrendered with Johnston to General Sherman on April 26, 1865. After the war he was president of the New Orleans, Jackson and Mississippi Railroad from 1865 to

1870, became Adjutant-General of Louisiana in 1878, and for some years was manager of the State Lottery. He declined an appointment to the chief command of the Rumanian troops in 1866, and, three years later, a similar appointment from the Khedive of Egypt. Consult Roman, *Military Operations of General Beauregard* (New York, 1883).

BEAUREPAIRE-ROHAN, bō'r'-pâr' rō'äɴ', HENRIQUES DE (c.1818-94). A Brazilian traveler and geographer, born in the Province of Piauhy of French extraction. In 1845 he began the exploration of territory south of Rio de Janeiro. He penetrated into Paraguay, subsequently publishing the results of his exploration in the work entitled *Descripção de uma viagem de Cuyabá ao Rio de Janeiro* (1846). Afterwards he was appointed by the Brazilian Government to collect statistical information on the interior provinces of the country. He later became lieutenant-general in the Brazilian Army, and in 1877 published the important geographical work entitled *Etudios acerca da organização da carta geographica e da historia physica e politica do Brazil* (1877).

BEAU'S DU'EL, THE; or, A SOLDIER FOR THE LADIES. A comedy by Susannah Centlivre, taken from Mayne's *City Match*. It was produced in October, 1702, at Lincoln's Inn Fields, and was printed in quarto in the same year.

BEAU SABREUR (bō sȧ'brẽr'), **LE** (The Handsome Swordsman). A name applied to Murat.

BEAUTEMPS-BEAUPRÉ, bō-täɴ' bō'prâ', CHARLES FRANÇOIS (1766-1854). A distinguished French hydrographer, born at Neuville-au-Pont. He accompanied the expedition sent in search of La Pérouse in 1791, and made valuable charts of many of the places visited then and subsequently, when he was employed in all the important hydrographic labors undertaken during the Empire and the Restoration. The perfection of his work earned him the name of 'the father of hydrography.' He was elected a member of the Academy of Sciences in 1810, and was appointed chief hydrographer and keeper of the dépôt of marine and the colonies in 1814.

BEAU'TIFUL SNOW. A well-known poem by John W. Watson, published in 1858 in *Harper's Weekly*.

BEAUTY, bū'tĭ. See ÆSTHETICS; ART.

BEAUTY AND THE BEAST. A story, first told in Straparola's *Piacevoli notti* (1550), of a self-sacrificing daughter who accepts the addresses of a beast, and later falls in love with him because of his kindness. This breaks the spell, and he regains his human form. There is a French version in Mme. Villeneuve's *Contes marines* (1740); another by Mme. Beaumont (1757). Among numerous English adaptations may be mentioned that of Miss Thackeray. It is also the basis of Grétry's opera, *Zémire et Azor*.

BEAUVAIS, bō'vâ' (from *Bellovacum*). The capital of the Department of Oise, in the old Province of Ile de France, France, situated in the Valley of the Thérain (a tributary of the Oise), 41 miles north-northwest of Paris, and surrounded by rising woodlands (Map: France, H 2). It is the seat of a bishop, and contains a public library of 20,000 volumes, a museum, etc. Among its several fine buildings, the most noteworthy is its uncompleted Cathedral of Saint Pierre, which consists of nothing but a choir and transept of amazing proportions, built in the decorated Gothic style. It was begun in 1225 and was intended to rival that of Amiens. The Basse Œuvre is the former cathedral, a Romanesque building of great antiquity. The manufactures of Beauvais include woolen cloth, shawls, carpets, Gobelin tapestry, etc. Beauvais carries on a brisk trade in grain and wine. Population, in 1896, 19,900. It was included in the country of the powerful Bellovaci, in Gallia Belgica, and was known by the Romans as Cæsaromagus, afterwards as Bellovacum. The Jacquerie, or Peasants' War, broke out in the neighborhood of Beauvais, March 21, 1358. In 1472 the town was besieged by Charles the Bold of Burgundy, with an army of 80,000 men, when the women of Beauvais, under the leadership of the heroine, Jeanne Lainé, surnamed La Hachette for her daring, joined in the defense. Consult Labande, *Histoire de Beauvais* (Paris, 1892).

BEAUX, bō, CECILIA (1863—). An American figure and portrait painter. She was born in Philadelphia; studied painting first from William Sartain, then, going to Paris in 1899, under Bouguereau and Constant, Courtois and Dagnan-Bouveret. She has received a number of prizes, including the gold medals of the Philadelphia Art Club (1893), the Carnegie Institute, Pittsburg (1899), the Buffalo Exposition (1901), and the Dodge prize of the National Academy, and is a member of the Society of American Artists, the National Academy, and the Société Nationale des Beaux Arts. Among her best-known paintings are "Last Days of Infancy" (1885), portraits of Rev. James Grier and her niece Ernesta, "Sita and Sarita," "Cynthia" (Miss Sherwood), "The Dreamer," "Mother and Daughter," "A New England Woman" (Philadelphia Academy), and "Dorothea and Francesca," daughters of Richard Watson Gilder, whose portrait she also exhibited at the St. Louis World's Fair in 1904. She was a member of the international jury of the Paris Exposition of 1900. Miss Beaux unites with a fine feeling for color a freedom of brushwork which contributes much to the pleasure-giving qualities of her art. There is no sense of effort conveyed in the manipulation of pigment; no dull and heavy tones. Everything she paints lives through the vivacity of her happy stroke, and her work becomes art by the felicitous way in which it is done.

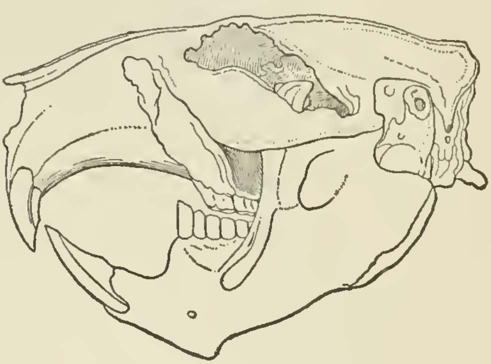
BEAUX' (bōz) **STRAT'AGEM**, **THE.** See FARQUHAR, GEORGE.

BEAUX-ARTS, bō'-zär', ACADÉMIE DES. One of the five academies of the Institut de France. Its origin is traced to an unofficial association of artists in the Fourteenth Century, which received royal recognition in 1648, and was united in 1795 with the Academy of Architecture. Its membership numbers 41, besides 10 honorary and 10 foreign associates, and 40 corresponding members. Its publications embrace transactions, memoirs, and the *Dictionnaire Général des Beaux Arts*.

BEA'VER (AS. *beofer*, Ger. *Biber*, OCh. Slav. *bebrŭ*, Skt. *babhrus*, large ichneumon, also 'brown'; to this latter root the word may possibly ultimately belong). A large aquatic rodent of the family Castoridæ, remarkable for its constructive habits, and yielding a valuable fur and the substance castoreum. The family includes only one species, in the opinion of the majority of naturalists, which is, or has been, distributed throughout most of the forested parts of the North Temperate Zone. To this species Linnæus gave the name *Castor fiber*, and the American form has been regarded as merely a variety of it. Recent American specialists, like Rhoads (*Proc. Am. Philos. Soc.*, 1898), believe, nevertheless, that the American beaver is specifically different from that of the Old World, is entitled to the name *Castor Canadensis*, and is divisible into three distinct local races. In general characteristics all beavers agree so closely, however, that these niceties of classification may be left to the taxonomists.

The Old World Beaver, once widely common throughout Europe and Northern Asia, is now rare and isolated. Extinct in the British Isles since the Twelfth Century, a few colonies are preserved in the parks of the Marquis of Bute and other noblemen. It is said to exist in southeastern Norway, and isolated pairs are occasionally seen on some of the large German rivers, and in Austria, under protection of great landowners. "They also occur sparingly in Russia and Poland, in the streams of the Ural Mountains, and in those which flow into the Caspian. They live in burrows on the banks of rivers, like the water-rat, and show little of the architectural instinct so conspicuous in the American form; but this may be owing to unfavorable external conditions rather than to want of the faculty, for there is a well-authenticated instance of a colony of beavers, on a small stream near Magdeburg, whose habitations and dam were exactly similar to those found in America." In Siberia they still exist in considerable numbers, though their pelts do not now figure largely in the export of furs, and there the animal is inclined to erect lodges and dams.

The American Beaver was scattered primitively over all wooded North America, from Mexico to Labrador and the northwestern limit of tree-growth. It has been banished from all the more thickly settled parts, but survives in greater or less numbers throughout Canada north of civilized Ontario and Quebec, in the Rocky Mountain and Californian ranges, in the Appalachians south of West Virginia, and along the borders of northwestern Mexico. It is steadily decreasing, however, even in the Hudson Bay region. The beaver is usually at least 2 feet in length from the nose to the root of the tail, and weighs about 35 pounds, and the tail is about 10 inches in length. These dimensions are sometimes exceeded. The general form of the animal is thick and clumsy, broadest at the hips and squirrel-like. The body terminates in a thick oval tail, flattened transversely, about twice as long as broad, and naked of hairs, the surface being covered with plates of black, indurated skin, resembling horn-scales. The fore limbs are small and squirrel-like, the hinder ones large and powerful. Each foot has 5 toes; those of the fore-feet are short, and not connected by a web; those of the hind feet are long, spreading out like the toes of a goose, and webbed to the nails. In accordance with this remarkable peculiarity, the beaver in swimming makes use of the hind feet alone, the fore-feet remaining motionless and close to the body. The tail is of service as a sculling-oar and a rudder, and its loud slapping of the water when an alarmed animal dives is an effective signal of danger to others. The head is thick and broad, the nose obtuse, the eyes small, the ears short and rounded. The incisor or cutting teeth (two in each jaw) exhibit in the highest perfection this cardinal characteristic of the Rodentia. They are formed in front of hard, orange-colored enamel, while the back of the tooth is formed of a softer substance, more easily worn down, so that a sharp, chisel-like edge is always preserved; the bulbs being also persistent, so that the teeth are continually growing as they are worn away. There are four flat molar teeth (or grinders) on each side in each jaw.



SKULL OF A BEAVER.
Showing the chisel-like incisors.

The fur consists of two kinds, the longer hair comparatively coarse, smooth, and glossy; the under coat dense, soft, and silky. The color is generally chestnut, rarely black, spotted, or nearly white. The largest and reddest beavers are those dwelling on the streams of the northern Pacific Coast, the smallest and darkest those of the Hudson Bay region, while those inhabiting the southern Alleghanies are reddish brown, and those of the southern Rockies are pale. In consequence of its aquatic and bark-eating habits, the beaver is limited to the neighborhood of streams and ponds in wooded districts, and the northern range of the species is everywhere terminated by the limits of the forest growth. Its extraordinary powers of gnawing are exerted to cut down trees several inches in diameter, both for food and for the construction of those houses and dams which have rendered it so much an object of admiration to mankind. Dr. Elliott Coues mentions a poplar cut by beavers on the Upper Missouri, which he found to be 9 feet in circumference at the point of attack; but this was exceptional. This cutting is accomplished by the animals standing upon their hind feet and gnawing in parallel lines across the grain, then wrenching or biting out the chip between, and so steadily deepening the cut. The assertion that they can or do cause trees to fall in any desired direction is not justified by facts. Large trees are usually felled by the united efforts of a family of beavers.

Community Life and Architecture.—The architectural operations and coöperative life of these animals are very wonderful, although the statement, at one time commonly made, that beavers drive stakes into the ground, has no foundation in fact; and some of the other particulars which passed current along with it were equally fabulous. They dwell normally in colonies along streams, which may have been inhabited for scores of generations, and whose improvements represent the combined labor of thousands of individuals past and present. Such a colony begins by the settlement in the spring upon some sluggish, moderately deep woodland stream or pond of a pair of young beavers, who have emigrated thither from some old colony. Their first labor is to dig a burrow in the bank, the entrance to which is at a safe depth beneath the water, and the interior chamber at a safe height above its normal rise. In this burrow they make their home the first year, or perhaps two years; and such burrows, more or less in use and serving as refuges in danger, are common always in beaver settlements. It is essential that a sufficient depth of water be maintained before the door of this burrow to give clear ingress and egress under the winter's ice, and to afford room for storage of winter provisions; and in most places chosen by the animals this can be arranged only by damming the stream. As the droughts and low water of summer begin, therefore, the beavers seek a place in the stream a little below their residence, where it is narrow, not more than 2½ feet deep, and has a firm bottom, and begin a dam. Gnawing down saplings 10 or 12 feet long, they drag and float them to the spot, and sink them lengthwise, side by side, across the current, beginning at the centre of the channel and loading them with stones, sods, and mud, to keep them in place. They will handle remarkably large stones for this purpose. The work is gradually extended until it reaches the bank on each side, and in doing so a convex outline upstream is usually given; but this probably is an accident of the increasing pressure of the obstructed current on the progressing wings of the new dam rather than an engineering design, for reverse (or weak) curves are frequently seen. Such a dam grows constantly by the addition of all sorts of material—not only the logs and sticks from which the bark has been gnawed for food, but others cut for the purpose, and a constant intermixture of roots and branches with stones, moss, grasses, and mud.

Additions, as well as constant repairs, are made on the upper side, which comes to present a low slope and comparative solidity, while the lower front of the dam is a more abrupt tangle of sticks and branches. The beavers work at the dam only at night, except in an emergency, and each one does what it thinks proper in a quite independent way, though the result is for common benefit. After many years such dams may be 4 or 5 feet high at the channel, and stretch to the right and left across low ground for 50 yards or more, converting the space above it into a broad, grassy pond, having a network of clear channels. Morgan describes dams 600 feet long in northern Wisconsin, with many acres of flooded ground. The water does not flow over the tops of these dams, but percolates through them, though some of them become seemingly solid barriers of earth. "In places," says Hearne, "which have been long frequented by beavers undisturbed, their dams, by frequent repairing, become a solid bank, capable of resisting a great force, both of water and ice; and as the willow, poplar, and birch generally take root and shoot up, they by degrees form a kind of regular planted hedge, which I have seen in some places so tall that birds have built their nests among the branches." A large proportion of the marshy ponds and peat-bogs of the country have had this origin.

Meanwhile, from the first summer onward, the gradually increasing number of beaver families have built each for itself permanent homes, known from their resemblance to the Algonkian wigwam as 'lodges.' The sites chosen are along the banks of the stream or canal, and several houses may be so close together as to touch, or they may be widely scattered. The larger lodges are, in the interior, about 7 feet in diameter, and between 2 and 3 feet high, with the floor and inner walls made smooth by gnawing and wear. The entrances are always two, both leading down into the water, and in northerly regions there is no opening into the air—a needful precaution against the cold of mid-winter, as well as against such insidious foes as weasels and blacksnakes. This structure, like the dam, is formed of branches of trees, matted with mud, grass, moss, and other material. The walls are very thick, and the entire structure not only secures much warmth, but is an efficient protection from wolves, wolverines, and other beasts of prey, especially when solidly frozen in winter. Each family builds, maintains, and occupies its own lodge, the current belief that several families live together arising from the fact that the young beavers usually continue to live with their parents until the third year. Single 'bachelors' dwelling remote and alone are occasionally seen.

Food and Winter Provision.—The food of beavers is almost wholly the bark of deciduous trees, especially poplar, birch, willow, linden, and maple; they never eat 'evergreen' bark, and are absent from forests exclusively coniferous. In the summer they gnaw at fresh bark day by day, and also eat more or less of lily-roots and other green vegetables, berries, and leaves. The impossibility of obtaining this food in winter, when the waters and woods are clogged with ice and snow, compels them to prepare a supply. For this purpose the beavers become very active in the autumn, each family cutting down large trees and gnawing their limbs and trunks into sections small enough to be dragged to the water and floated to the neighborhood of their lodge. There this material is sunk to the bottom and firmly anchored (in a manner not comprehended), until a sufficient supply has been acquired. The dams are also especially repaired in autumn. The freezing of the stream puts an end to their labors, whereupon the beavers retire to their lodges and remain there, subsisting upon their store, pieces of which are daily taken into the house, or into some bank burrow, and the bark is eaten.

It will readily be seen that the supply of edible wood within a manageable distance from the water would soon be exhausted by a beaver colony, and perhaps the most important service of the dam and its pond is to provide against this contingency. In a flat country the mere raising of the water by flooding spaces of woods answers the purpose to some extent; but this is most intelligently supplemented by the animals, who dig deep canals, 2 or 3 feet wide, which penetrate

BEAVER, COYPU AND MUSKRAT

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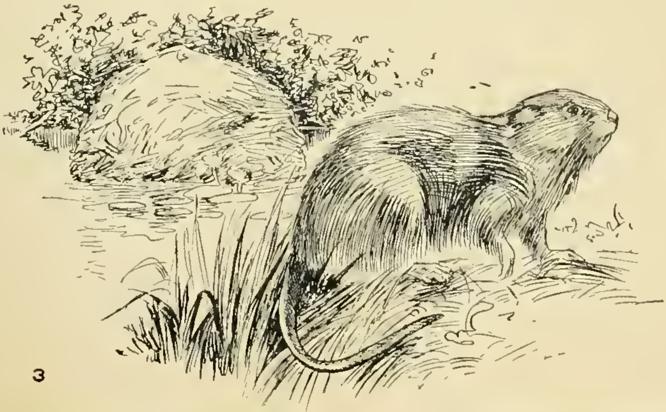

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1. COYPU (Myopotamus coypu), carrying young. 2. BEAVER (Castor canadensis) and house.
3. MUSKRAT (Fiber zibethicus), and winter lodge.

the woods in various directions, sometimes for 100 yards or more, and thus render accessible a large number of trees otherwise out of reach. These canals are kept open with great pains, while the rest of the pond becomes gradually grown up with grass, and they form avenues along which lodges and burrows are placed, and where the colony may swim freely, and float their food and building materials from the woods to their lodges and dams, of which latter, on a long-tenanted and favorable stream, several may exist. This perfection of beaver economy is by no means seen everywhere, but might commonly be observed previous to 1850 in such highly favorable regions as the swampy forests about the headwaters of the Mississippi, and it is being renewed in northern Maine, where, under the protection of law, beavers are increasing and reoccupying their ancient haunts.

Economic Considerations.—Beavers are closely related to the squirrels, and, like them, 'sit up' a great deal, holding their food up to their mouths in their fore paws, which otherwise are used very dexterously. It is needless to contradict the many foolish stories as to the use of the tail as a vehicle for carrying mud, a trowel for applying it, and so on. The animals live well in confinement, and colonies are flourishing in zoölogical gardens and parks in New York, Washington, and other American cities, as well as abroad, where small, watered valleys, fenced with wire, are devoted to them. In closer captivity they betray their constructive instincts by weaving the sticks supplied them into the bars of their cages. They have usually four young at a birth, and keep them at home for two years.

The fur of the beaver, by reason of its softness and density, is one of the most valuable yielded by any animal, and in former times was the staple of the fur trade, especially in America, when the early prosperity of Canada and New York was based upon it. (For statistics see FURS AND THE FUR TRADE.) It is probable that only the invention of silk-plush applied to the making of hats saved the animal from extinction long ago. Beavers were obtained mainly by wasteful methods of trapping, and they are so obtained yet, and chiefly in winter. Their nocturnal habits and extreme shyness make the shooting of them impracticable. Their flesh is esteemed by the Indians and frontiersmen.

Large glandular pouches, two in number, closely connected with the organs of reproduction, contain the substance called *castoreum* (q.v.). Its uses in the animal economy are by no means well known; they are probably analogous to those of musk and civet, but its peculiar pungent odor is so attractive to beavers that use is made of it as a bait for beaver-traps.

The beaver family dates from the middle of the Tertiary period, a fossil species of very large size occurring in the Upper Pliocene of Europe. Fossils of a small size and some distinctive peculiarities are found in the Miocene of the United States.

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BEAVER, JAMES ADDAMS (1837—). An American soldier and politician, born at Millerstown, Pa. He graduated at Jefferson College (Canonsburg, Pa.), in 1856, and practiced law from 1859 to 1861. From 1861 to 1864 he served in the Federal Army, and in the latter year was mustered out with the rank of brevet brigadier-general. He was major-general of the Pennsylvania National Guard until 1887, and from 1887 to 1891 was Governor of the State. He was a delegate to the National Republican Convention of 1880, and in 1898 was appointed a member of the President's commission for the investigation of the War Department.

BEAVER DAM. A city in Dodge County, Wis., 65 miles northwest of Milwaukee; at the outlet of Beaver Lake, and on the Chicago, Milwaukee and Saint Paul Railroad (Map: Wisconsin, E 5). It is the market for a fertile district, and has good water-power, flour, cotton and woolen mills, malleable-iron works, cold-storage plant, and manufactures of machinery, lumber, staves, etc. The city contains parks, a public library of 10,000 volumes, and Wayland Academy. Settled in 1841, Beaver Dam was incorporated in 1856. It is governed, under a revised charter of 1889, by a mayor, elected biennially, and a city council. Population, in 1890, 4222; in 1900, 5128.

BEAVER DAM CREEK, BATTLE OF. See MECHANICSVILLE, BATTLE OF.

BEAVER FALLS. A borough in Beaver County, Penn., 31 miles northwest of Pittsburg; on the Beaver River, near its confluence with the Ohio, and on railroads of the Pennsylvania and Erie systems (Map: Pennsylvania, A 3). It is in a region which abounds in natural gas and coal, and has manufactures of steel, iron, wire, axes, shovels, glassware, tubing, files, pottery, etc. The borough is the seat of Geneva College (Reformed Presbyterian), organized in 1848, and contains fine post-office and municipal buildings, and Riverview Park. Beaver Falls was originally called Brighton, and was chartered as a borough in 1868. It is governed by a mayor, elected for three years, and a city council, which elects administrative officials. Population, in 1890, 9735; in 1900, 10,054.

BEAVER IS'LANDS. A group of islands in Lake Michigan, about 40 miles west of the Straits of Mackinac, and forming part of Charlevoix County, Mich. (Map: Michigan, H 3). They derive their name from the largest of the group, Beaver Island. The township of Saint James, on Beaver Island, has a population, according to the census of 1900, of 420; Peaine township having 372 inhabitants. Several lighthouses are maintained on these islands. The Mormons made an unsuccessful attempt to found a settlement there in 1846.

BEAVER STATE. Popular name of Oregon. See STATES, POPULAR NAMES OF.

BEA'VERWOOD. See MAGNOLIA.

BEBEE'RINE (from *bebeery*, the native name of the tree). A bitter alkaloid occasionally used in medicine, in the form of its sulphate, as a substitute for quinine, and, on account of its stimulating action on the stomach, as a stomachic. It is obtained from the bark of the Greenheart-tree (*Nectandra rodiæi* of the order *Laurineæ*), indigenous to British Guiana.

BEBEE'RU. See GREENHEART.

BEBEL, bā′bel, FERDINAND AUGUST (1840—). A leader of the Social-Democratic Party in Germany. He was born at Cologne, set up as a master-turner at Leipzig in 1864, identified himself with the Socialistic movement among the working classes, and in 1867 became chairman of the permanent committee of the German workingmen's unions. In 1869 he assisted at Eisenach in founding the Social-Democratic Party, which was closely affiliated with the International Workingmen's Association, established at London by Karl Marx. He was accused in 1872 of projected high treason against the Kingdom of Saxony and the German Empire, and of *lèse-majesté* against the German Emperor. On the combined charges he was sentenced to imprisonment for two years and nine months. His incarceration on these and subsequent charges has, however, served only to increase his prestige among his party associates. In 1867 he was elected deputy to the North German Diet, and since 1871 he has been almost continuously in the Reichstag, representing successively the districts of Glauchau-Meerane, Dresden, Strassburg, and Hamburg. In 1868 he became connected with the staff of the *Volksstaat* at Leipzig, and in 1891 with that of the *Vorwärts* at Berlin. Bebel is recognized as an effective orator. His publications include *Der deutsche Bauernkrieg* (1876); *Die parlamentarische Thätigkeit des deutschen Reichstags und der Landtage* (1876); *Die Frau in der Vergangenheit, Gegenwart, und Zukunft* (1883; later as *Die Frau und der Socialismus*, 27th ed., 1896); *Die Sonntagsarbeit* (1888); and *Die Socialdemokratie und das allgemeine Wahlrecht* (1895).

BEBEL, HEINRICH (1472-1518?). A German humanist. He was born at Ingstetten (Württemberg). He studied at Cracow and Basel, and in 1497 was appointed professor of eloquence and poetry at the University of Tübingen. In 1501 he was crowned poet laureate by the Emperor Maximilian. His best-known two works are his *Proverbia Germanica* (1508; new ed., Leyden, 1879), and his *Facetiæ* (1508), a collection of jests and anecdotes directed against the Roman Catholic clergy. He was a friend of Erasmus. For his biography, consult Zapf (Augsburg, 1802).

BEC. An historic French ruin in the Department of Eure, near Brionne. It was once an abbey, which Lanfranc and Anselm made a centre of learning in the Eleventh Century.

BECCAFICO, bĕk′kȧ-fē′kō (It. from *beccare*, to peck + *fico*, fig). An Italian name given in the south of Europe to various small and elegant warblers (Sylviidæ), used as table delicacies, and specifically to the olive-brown garden-warbler or pettychaps (*Sylvia hortensis*), migratory in England. It haunts the fig orchards and vineyards, and pecks holes in the rind of the ripening fruit, seeming to prefer to all others the variety of fig known in Italy as 'fetifero.' The damage done is slight, however, and some persons believe that in each instance the bird has found and removed an insect attacking the fruit. After fattening in the autumn upon this fruit their flesh becomes a dainty for the table, and they are shot for market in great numbers, though each affords hardly more than a mouthful of food. See FIG.

BECCAFUMI, bĕk′kȧ-fōō′mē, DOMENICO, also called IL MECHERINO (1486-1551). An Italian painter and sculptor. He was the son of Giacomo de Pace, a peasant laborer on the estate of Lorenzo Beccafumi, a wealthy citizen of Siena, who took the boy into his service, and fostered his natural taste for art by placing him in the studio of Capanna in Siena, and afterwards sending him to study in Rome. Beccafumi painted many religious pieces and mythological works. He also continued the wonderful pavement in the Cathedral of Siena. For years the best artists worked upon this pavement, which was of white marble, the subject being engraved in black outline, and the border inlaid with magnificent patterns of varied colors. Beccafumi was occupied on this work twenty-seven years. His finest paintings are the frescoes on the ceiling of the city hall in Siena and an altar-piece in the museum there.

BECCARI, bĕk-kä′rē, ODOARDO (1843—). An Italian naturalist. He was born at Florence and studied at Pisa. The three years from 1865 to 1868 he spent in Borneo, and from 1871 to 1876 he traveled in Celebes, New Guinea, and other of the East Indies. The results of his researches were published in the *Nuovo Giornale Botanico Italiano*, which he had founded in 1869; and in the *Bolletino della Società geografica italiana.* He is also the author of a work, in two volumes, entitled *Malesia* (1884-85).

BECCARIA, bĕk′kȧ-rē′ȧ, CESARE BONESANO, Marquis of (1735-93). An Italian economist and jurist, born in Milan. The opinions of the French encyclopædists, as well as those of Montesquieu, had the greatest influence on the development of his thought. He wrote on the currency and other economic subjects, but his greatest work was his *Trattato dei delitti e delle pene* (Treatise on Crimes and Punishments), first published in 1764, in which he argues against capital punishment, and which established his fame as the originator of more humane methods in dealing with criminals. The work was extremely popular, passing through six editions within eighteen months, and was translated into many European languages. Kent unfairly accuses the author of an affected humanity, but did expose the invalidity of some of the arguments brought forward. Beccaria was among the first to advocate the beneficial influence of education in lessening crime. In 1768 Beccaria was appointed professor of public law and economy at Milan, and achieved great success as a lecturer. His lectures are published in the Italian collection, *Scrittori classici italiani*, Vols. XI. and XII., where also a biographical sketch will be found. A translation of his essay on "Crimes and Punishments" is included in J. A. Farrar's *Crimes and Punishments* (New York, 1872; London, 1880).

BECCARIA, GIAMBATTISTA, or GIOVANNI BATTISTA (1716-81). An Italian physicist. He was professor of experimental physics at Rome, Palermo, and Turin. In 1759 he was commissioned to measure an arc of a meridian in Piedmont. His principal work is *Dell'elettricismo naturale ed artifiziale* (1753).

BECHAMEL, bĕsh′ȧ-mĕl (Fr. *béchamel*). A fine white broth, or sauce, thickened with cream; so named from its inventor, the Marquis de Béchamel, steward of Louis XIV.

BÊCHE-DE-MER, bâsh′de-mâr′ (Fr., a holothurian). See TREPANG.

BECHER, běk′ẽr, JOHANN JOACHIM (1635-82). A German chemist, born at Speyer. He acquired an extensive knowledge of medicine, physics, chemistry, and economics; then taught and practiced medicine at Mainz. Later he founded a chemical laboratory at Munich, and in 1660 he was called to Vienna to inaugurate extensive commercial and industrial establishments. Becher had many enemies, and was accused—not altogether unjustly—of charlatanry. In his *Physica Subterranea* (1669), we find the first clear mention of the imaginary fiery principle (*'terra pinguis'*), which afterwards, under the name of phlogiston, played so important a rôle in chemical theory. Consult Erdberg-Krezenciewski, *Johann Joachim Becher* (Jena, 1896).

BECHER, SIEGFRIED (1806-73). An Austrian political economist, born at Plan (Bohemia). He studied at Prague and Vienna, was appointed professor at the Polytechnic Institute, Vienna, in 1835, and from 1848 to 1852 was employed in the ministry of commerce. His works include *Das österreichische Münzwesen von 1524-1838* (1838); *Statistische Uebersicht des Handels der österreichischen Monarchie mit dem Auslande während der Jahre 1829-38* (1841); and *Ergebnisse des Handels- und Zolleinkommens der österreichischen Monarchie von den Jahren 1819-43* (1846).

BECHSTEIN, běk′stīn, JOHANN MATTHÄUS (1757-1822). A German naturalist, born at Waltershausen (Gotha), and educated at Jena. In 1795 he founded the school of forestry at Waltershausen, and in 1800 was appointed director of the Academy of Forestry at Dreissigacker. He published *Die Forst- und Jagdwissenschaft nach allen ihren Teilen* (1818-27); *Die Waldbeschützungslehre* (1818); *Abbildungen naturhistorischer Gegenstände* (1796-1810); *Naturgeschichte der Hof- und Stubenvögel* (1870).

BECHSTEIN, LUDWIG (1801-60). A German author, born at Weimar. He first studied pharmacy, but subsequently devoted himself to the study of philosophy, literature, and history at the universities of Leipzig and Munich, and in 1831 was appointed librarian of the Ducal Library at Meiningen. He was a learned student of Germanic folk-lore, wrote novels and verses, but is chiefly known for his collection of fairy-stories. His publications include the poems *Der Totentanz* (Leipzig, 1831) and *Luther* (1834); the tale, *Fahrten eines Musikanten* (1836-37); and the *Deutsches Märchenbuch* (1879) and *Neues deutsches Märchenbuch* (1882).

BECHUANALAND, be-chwä′nä-lănd. A name applied to the territory in southwestern Africa inhabited by the Bechuanas (q.v.) (Map: Cape Colony, H 4). It includes the Crown colony of Bechuanaland, annexed to Cape Colony since 1895, and the Bechuanaland Protectorate. The latter comprises all the territory bounded by the Molopo and the Zambezi rivers, the Transvaal Colony, southern Rhodesia, and German Southwest Africa. Its area is estimated at 213,000 square miles. Bechuanaland is for the most part a high plateau, with an elevation of from 4000 to 5000 feet, and is more adapted for cattle-raising than for grain. In spite of its almost tropical situation, the climate is only a little inferior to that of Cape Colony and is very healthful for Europeans. The country is poorly watered, and there are several dry river-beds, which fill up during the rainy season. The chief industry is cattle-raising. The protectorate is administered by the native chiefs under the guidance of a British Resident. The revenue is derived from customs and a hut-tax, the latter collected by native chiefs. There is a railway line open beyond Buluwayo, in Rhodesia. The population is estimated at 200,000, and consists chiefly of the tribes of Bamangwato, Bakhatla, Bakwena, Bangwaketse, and Bamaliti. They have their fixed boundary lines, and have retained some of their political institutions. Consult: *Annual British Colonial Reports* (London); Macnab, *On Veldt and Farm* (London, 1900).

BECHUANAS, be-chwä′naz. Tribes of Bantu stock in the Transvaal Colony and centre of South Africa, who since the colōnizing of South Africa have become well known. In response to civilizing influences, and from natural adaptability, the Bechuanas are among the most advanced nations of Africa. Their strong military and political organizations are shown in the formation of powerful native 'kingdoms' and the extensive migratory movements of the tribes, though they are peaceable in disposition and skillful agriculturists. Totemism prevails, and 'rain-doctors' exercise much influence. In color they are brown rather than black; their height averages 1.684 metres.

BECK, MADAME. A leading character in *Villette*, a novel by Charlotte Brontë.

BECK, CARL (1856—). A German-American physician, born at Neckargemünd, Baden. He studied at the universities of Heidelberg, Berlin, and Jena, came to the United States in 1882, and was appointed surgeon to Saint Mark's Hospital, New York City, in 1886. Subsequently he became professor of surgical pathology in the College of Physicians and Surgeons of Chicago. He has published a *Manual of Surgical Asepsis* (1895) and a *Text-book on Fractures* (1900).

BECK, CHRISTIAN DANIEL (1757-1832). A German scholar of distinction. He was born at Leipzig, and studied at the University there. In 1782 he was appointed professor of Greek and Latin literature at the university, and in 1819 professor of history. In 1825 he resumed the former chair. His method of literary instruction was historical rather than critical. From 1819 until his death he was editor of the *Allgemeines Repertorium der neuesten in- und ausländischen Litteratur*. His works include the following: *Anleitung zur Kenntnis der allgemeinen Welt- und Völkergeschichte* (1787-1807); *Commentarii Historici Decretorum Religionis Christianæ et Formulæ Lutheranæ* (1801); *Commentarii Societatis Philologicæ Lipsiensis* (1801-04); and editions of Aristophanes (with Invernizzi and Dindorf), Apollonius Rhodius, Plato, and Cicero.

BECK, JAMES BURNIE (1822-90). An American politician, born in Dumfriesshire, Scotland. He graduated at the law school of Transylvania University, Lexington, Ky., and from 1866 to 1875 was a member of Congress. From 1876 until his death he was United States Senator from Kentucky. He was a member of the commission appointed to define the Maryland-Virginia boundary, and was prominent in the discussion of tariff and currency questions.

BECK, Johann Nepomuk (1828-1904). An Austrian barytone. He was born in Budapest, where in 1846 his fine voice attracted the attention of the singer Erl, and of Carl Formes, who induced him to study music. After making his début at Budapest as Ricardo in *I Puritani*, he obtained in 1853 a position at the Imperial Opera, Vienna, with which theatre he remained associated until his retirement in 1885. His deep barytone voice, of a uniform and beautiful quality throughout, and his effective acting, produced a profound impression. His principal rôles were William Tell, Don Giovanni, Hans Sachs, and Alberich. During the last years of his life he was insane.

BECK, Johann Tobias (1804-78). A German theologian, born at Balingen, in Württemberg. He studied theology at Tübingen (1822-26), spent several years in the ministry, and was a professor, first at Basel, and then, after 1843, at Tübingen. He believed in orthodox Bible Christianity, and was opposed to the 'Tübingen School,' which then flourished under the leadership of his fellow professor, F. C. Baur. Among his numerous publications, *Outlines of Biblical Psychology* (1877) and *Pastoral Theology of the New Testament* (1885) have been published in English. For his life, consult Riggenbach (Basel, 1887).

BECK, Karl (1817-79). An Austrian poet, born in Baja, Hungary. He studied in Vienna and Leipzig, lived in Berlin from 1844 until the outbreak of the Revolution of 1848, and subsequently in Vienna, where he was an editor of the *Lloyd*. His poetic writings skillfully interpret the national life and spirit of Hungary. *Jankó, der ungarische Rosshirt* (1842; 3d ed., 1870) is considered by many his best work. Other volumes are *Gesammelte Gedichte* (1844; 9th ed. 1869) and *Aus der Heimat* (1852; 4th ed. 1862).

BECK, Lewis Caleb (1798-1853). An American physician, chemist, and mineralogist, born in Schenectady, N. Y. He graduated at Union College, was professor of chemistry in Rutgers College, and later in Albany Medical College. He was the author of a number of books and papers on botany and chemistry; also of an elaborate report on the mineralogy of New York, based upon his researches as mineralogist of the New York Geological Survey of 1835-41, which was published as one of the volumes of the *Natural History of the State of New York* (1842).

BECKE, George Louis (1848—). An Australian novelist. He was born at Port Macquarie, New South Wales. He was a trader in the South Sea Islands from 1870 to 1893, but afterwards removed to England. Becke, who belongs to the school of Stevenson and Conrad, has written, single-handed and in collaboration with Walter Jeffery, many stirring tales of adventure in the Pacific islands. Among them are: *By Reef and Palm* (1894); *The Ebbing of the Tide* (1896); *Pacific Tales* (1897); *Wild Life in Southern Seas* (1897); *The Mutineer* (1898); *Ridan the Devil* (1899); *The South Sea Pearler* (1900); *Tom Wallis* (1900); *The Tapir and Other Stories* (1901); *By Rock and Pool* (1901); and *Breachley: Black Sheep* (1902). See Australian Literature.

BECKENHAM, bĕk'en-am. A town in Kent, England, 8¾ miles southeast of London, with two stations on the London, Chatham and Dover Railway (Map: England, F 5). The municipality owns an electric-lighting plant and public baths and maintains a technical institute. Population, in 1891, 20,700; in 1901, 26,300.

BECK'ER, August (1821-87). A German landscape painter, born at Darmstadt. He studied there under Schilbach, and afterwards at Düsseldorf, and in 1844 traveled in Norway, Switzerland, the Tyrol, and the Scotch Highlands. At Balmoral he instructed the English princesses in landscape painting. His pictures of mountain scenery are particularly valued; they include: "Evening in the Bernese Oberland" (1860 and 1867); "Norwegian Tableland" (1861); and "The Kaisergebirge in the Tyrol" (1864).

BECKER, August (1828-91). A German author; born at Klingenmünster. He studied at Munich, from 1855 to 1859 was a member of the staff of the *Allgemeine Zeitung* of Augsburg, and from 1859 to 1864 editor of the liberal *Isar-Zeitung*. He published *Jungfriedel, der Spielmann* (1854), a poem which established his reputation, and considerable fiction, including *Des Rabbi Vermächtnis* (1866); *Vervehmt* (1868), which was attacked for containing alleged portraitures of contemporaries of the Bavarian Court, and *Der Küster von Horst* (1889).

BECKER, George Ferdinand (1847—). An American geologist; born in New York City. He graduated at Harvard in 1868, and subsequently pursued his scientific studies at Heidelberg and at Berlin. He was instructor in mining and metallurgy at the University of California from 1875 to 1879, and was associated with the United States Geological Survey from 1879 to 1892, and from 1894 to 1897. From 1879 to 1883 he was special agent of the Tenth Census, and in 1896 made an examination of the gold and silver mines of South Africa. In 1898 he accompanied the United States Army to the Philippine Islands as geologist, and upon his return was appointed director of the Division of Chemical and Physical Research. The following is a partial list of his principal works: *Atomic Weight Determinations: A Digest of the Investigations Published Since 1814* (1880); *Geology of the Comstock Lode and the Washoe District* (1882); *Statistics and Technology of the Precious Metals* (with S. F. Emmons, 1885); *Geology of the Quicksilver Deposits of the Pacific Slope* (1886); *Gold-Fields of the Southern Appalachians* (1895); *Reports* on the gold-fields of South Africa and Alaska, and on the geology of the Philippine Islands. Becker's most important work has been in connection with the origin and mode of occurrence of ore deposits, especially those of the Western States, to the knowledge of which he has made extensive contributions.

BECKER, Jakob (1810-72). A German genre painter, born at Dittelsheim. He studied first at Worms, and subsequently under Schirmer at Düsseldorf, and in 1840 was appointed professor of genre and landscape painting in the Städel Institute at Frankfort-on-the-Main. One of his best-known works is the "Praying Peasant Family."

BECKER, JEAN (1833-84). A German violin virtuoso. He was born at Mannheim, and studied with Kettenus and Vincenz Lachner. After a short period as a conductor at Mannheim he entered upon a series of brilliant concert tours (1858), and finally settled in Florence, Italy, where in 1886 he established the famous Florentine Quartet.

BECKER, KARL (1823-96). A German statistician, born at Strohausen (Oldenburg). He fought in the campaigns of 1848, 1849, and 1850 against Denmark, and rose to be a captain in the Army of Schleswig-Holstein. In 1855 he organized the statistical bureau of Oldenburg, of which he became director, and from 1872 until his retirement in 1891 was director of the statistical office of the German Empire. He edited *Statistische Nachrichten über das Grossherzogthum Oldenburg* (1857-72), and from 1877 the *Monatshefte zur Statistik des Deutschen Reichs*. His writings include *Zur Berechnung von Sterbetafeln* (1874).

BECKER, KARL FERDINAND (1775-1849). A German philologist, born at Lieser, Prussia. He studied at the University of Göttingen, became a physician at Offenbach in 1815, and there opened a small private school. Here his work as an instructor led him to make researches in philology, which for a time met with considerable recognition. His view was that all languages are subject to certain logical and philosophical principles, and that thus a science of comparative philology might be arrived at by a process of deduction. This method was later largely discredited by the investigations of Jakob Grimm and others, whereby comparative philology is based on principles of history and ethnology and is attained inductively. Becker's works include: *Deutsche Wortbildung* (1824), *Ausführliche deutsche Grammatik* (3 parts, 1836-39), and *Der deutsche Stil* (1848; 3d ed. revised by Lyon, 1884). Consult Helmsdörfer, *Becker der Grammatiker* (Frankfort, 1854).

BECKER, KARL FERDINAND (1804-77). A German writer on music, and organist. He was born in Leipzig. He was made professor of organ-playing at the Conservatory in 1843, but resigned in 1856. Among his works on the history of music, which place him in the same rank with Kiesewetter and Winterfeld, the most important are: *Die Hausmusik in Deutschland im 16. 17. und 18. Jahrhundert* (1840); *Die Tonkünstler des 19. Jahrhunderts* (1847). He was also among the most active contributors to the *Neue Zeitschrift für Musik*.

BECKER, KARL FRIEDRICH (1777-1806). A German historian, born in Berlin. He studied at Halle, and for a time was a teacher at Kottbus and Berlin. He wrote *Erzählungen aus der alten Welt für die Jugend* (Halle, 1873), and a *Weltgeschichte für Kinder und Kinderlehrer* (Halle, 1801-05), since frequently reprinted and so enlarged and revised by Woltmann, Menzel, Loebell, and others as to leave, in spite of the gain in fullness and scientific accuracy, scant traces of its original charm of style and arrangement.

BECKER, KARL LUDWIG FRIEDRICH (1820-1900). A German historical painter, born in Berlin. He was a pupil of von Klöber, Cornelius, and Hess, afterwards studied in Paris, Rome, and Venice, and first attained success with subjects of the Venetian Renaissance. The chief characteristics of his manner are historical fidelity, skillfulness of technique, and richness of coloring. His works include "Belisarius as a Beggar" (1850), "Doge in Council" (1864), "Charles V. and Fugger" (1870), and "Emperor Maximilian Receiving the Venetian Embassy" (1877).

BECKER, NIKOLAUS (1809-45). A German poet, born at Bonn. He is the author of the well-known song beginning, "Sie sollen ihn nicht haben, den freien, deutschen Rhein," which, as an outburst of the popular German sentiment of the day, became widely celebrated. There are more than seventy different musical settings of it, only one of which, however, has become popular. The song was answered by a number of French poets, notably Alfred de Musset ("Nous l'avons eu, votre Rhin allemand") and Lamartine ("Marseillaise de paix").

BECKER, OSKAR (1839-68). A German political fanatic, known for his attempted assassination of King William I. of Prussia. He was born at Odessa. In 1859 he entered Leipzig University, and in 1861, at Baden-Baden, endeavored to kill the King by firing two shots from a pistol, at a distance of three paces. The monarch suffered only a slight injury of the neck. The assassin, in a letter found upon him, stated as his motive the conviction that King William was unequal to the task of uniting Germany. He was sentenced to twenty years' imprisonment, but was pardoned by the King, and released in 1866, with the stipulation that he should leave Germany forever. He lived for a time at Chicago, and subsequently went to Alexandria, Egypt, where he died.

BECKER, PHILIP JOHANN (1809-86). A German radical. He was born at Frankenthal, in the Palatinate, grew up extremely democratic in his beliefs, and became a common laborer by preference. For his participation in the revolutionary movements of 1830, he suffered imprisonment. He finally turned to Switzerland, which was then the home of political outcasts from every land. There he fought under Ochsenbein, against the Catholic cantons of the Sonderbund. Upon the failure of Hecker's attempt to revolutionize Baden (1848), Becker, who had organized troops for his support, returned to Switzerland and put himself at the head of an expedition of German and Swiss auxiliaries to support the cause of freedom in Rome and Sicily. Their movements being frustrated, he led his troops (1849) into the Palatinate and the Grand Duchy of Baden, where a rising had taken place, and took a prominent part in many engagements, displaying great courage and strategic skill. Becker afterwards became known as a leader of the young Socialist Party, an active agitator on behalf of the International Association of Workmen, and the editor of many Socialist organs. Later he became a revolutionary collectivist and an adherent of Karl Marx.

BECKER, RUDOLPH ZACHARIAS (1752-1822). A German educator and author. He was born at Erfurt, and studied theology at the University of Jena. As instructor at the Basedow 'Philanthropin,' at Dessau, he founded a journal entitled *Dessauische Zeitung für die Jugend und ihre Freunde*, which he afterwards continued at Gotha (1784), under the title of *Deutsche Zeitung für die Jugend*, and which in 1796 was published as the *Nationalzeitung der Deutschen.* In consequence of an article in the latter publication, he was arrested by the French and imprisoned at Magdeburg for seventeen months. His experiences during that period were admirably described in the interesting narrative entitled *Beckers Leiden und Freuden in 17monatlicher französischer Gefangenschaft* (1814)—a work of genuine historical merit. One of his publications, bearing the title of *Not- und Hilfsbüchlein für Bauerleute, oder lehrreiche Freuden- und Trauergeschichte des Dorfes Mildheim* (Gotha, 1787-98), became exceedingly popular.

BECKER, Valentin Eduard (1814-90). A German composer. He was born at Würzburg, where he became celebrated as a composer of popular male choruses (*Das Kirchlein*, etc.). He also wrote several masses and two operas, entitled *Die Bergknappen* and *Der Deserteur.*

BECKER, Wilhelm Adolf (1796-1840). A German archæologist, born in Dresden. He was professor at Leipzig, and author of the famous stories of classical antiquity, *Charikles* (1840) and *Gallus* (1838; rev. ed. by Göll, 1880-82), in which he reproduced with an extraordinary, minute learning and deftness the familiar life of the days of Pericles and of Augustus. These are translated, with modifications, by Metcalfe (1886). They were suggested by the *Anacharsis* of J. J. Barthélemy (q.v.). Becker wrote, also, a good Latin treatise on Roman dramatic poetry, *De Comicis Romanorum Fabulis* (1837), and a useful *Handbuch der römischen Alterthümer* (1843-46).

BECKER, Wilhelm Gottlieb (1753-1813). A German archæologist and author, born at Oberkallenberg, Saxony, and educated at Leipzig. He became professor at the Ritterakademie, in Dresden, in 1782. In 1795 he was appointed director of the Dresden Gallery of Antiques, and of the Coin Cabinet, and in 1805 he was also intrusted with the superintendence of the celebrated Green Vault. He published *Augusteum, Dresdens antike Denkmäler enthaltend* (1832-37), with 162 engravings, *Zweihundert seltene Münzen des Mittelalters* (1813), and a large number of popular handbooks of art.

BECKERATH, bĕk′e-rät, Hermann von (1801-70). A Prussian statesman. He was born at Krefeld, in Rhenish Prussia, and after acquiring a considerable fortune in banking he turned his attention to politics. He served in the Diet of his province and in the Prussian Diet of 1847, and went as a deputy to the Frankfort Parliament of 1848, where he was an unswerving advocate of German unity and political liberty. His eloquence exercised considerable influence on this assembly. He was appointed Minister of Finance in the Ministry constituted for Germany under the auspices of the Parliament, and presently was called to Berlin to construct a Cabinet. He declined the task, because the King of Prussia would not give him a free hand in his scheme for the unification of Germany. When the reactionary movement set in, he resigned the posts he held under the Government, but continued, as a member of the Prussian Second Chamber, a vigorous opposition to the Manteuffel Ministry, which had deserted the cause of German unity. He withdrew from politics in 1852. After the return of Manteuffel to power in 1858, Beckerath was again elected a member of the Prussian Second Chamber, but was obliged to decline the honor on account of failing health. He devoted his later years to the affairs of Krefeld, his native town. Consult Kopstadt, *Hermann von Beckerath* (Brunswick, 1875).

BECKERS, bĕk′ẽrs, Hubert (1806-89). A German philosopher. He was born at Munich, and studied at the university there. In 1832 he was appointed professor of philosophy at the Lyceum at Dillingen, and in 1847 professor of philosophy at the University of Munich. He is chiefly known as an expositor of the philosophy of Schelling. His works include: *Cantica Spiritualia* (1845-47), *Ueber die Bedeutung der Schellingschen Metaphysik* (1861), *Ueber die Bedeutung der Naturphilosophie Schellings* (1864), and *Aphorismen über Tod und Unsterblichkeit* (1889).

BECK′ET, Thomas À (c.1118-70). Archbishop of Canterbury, born in London. He was the son of a merchant and was educated at Merton Priory (Surrey), London, and Paris, and later studied canon law at Bologna and Auxerre. After earning his living for a time as a notary and clerk, he became connected with Archbishop Theobald of Canterbury, receiving two church livings and various offices. In 1155 Henry II. made Becket Chancellor of England. His duties were numerous and burdensome and were vigorously discharged. His style of living was ostentatious, and when necessary he equipped troops at his own expense and commanded them in person. On May 23, 1162, he was elected Archbishop of Canterbury, through the King's influence. His private life in the past had been above reproach, and as archbishop he was noted for his zeal, devotion, and piety. He soon came into conflict with the King. In 1163 he opposed the King in a matter of taxation, acting as the champion of the people. He also maintained vigorously all the prerogatives of the Church, in spite of the King's anger and hostility. Henry (1164) caused the Constitutions of Clarendon (q.v.) to be drawn up, embodying the ancient customs and laws of the country, but Becket refused to seal them, declaring them contrary to canon law. A contest followed, in which the archbishop firmly resisted the King's authority, whenever it conflicted with what he held to be the rights of the Church. Henry was determined to humble the archbishop, and under various pretexts mulcted him in large sums of money. Finally, when Becket, driven to desperation, appealed to the Pope, he was declared a traitor and compelled to flee secretly from England, November 2, 1164. For the next six years he remained in France. Henry confiscated Becket's property, and was threatened by him with excommunication and interdict. Various attempts at reconciliation were made in vain. Finally, in 1170, after the King's son had been crowned by the Archbishop of York, in direct opposition not only to custom and law, but also to the express commands of Becket and the Pope, Henry felt obliged to make terms. Becket, anxious to return to England, was promised the restoration of all his confiscated property. He landed in England on December 1, 1170, and immediately the struggle between King and prelate broke out anew. Becket refused to absolve the bishops who had taken part in the coronation, because, after having disobeyed the Pope, they were unwilling to swear to obey in the future. On December 29, 1170, four knights went to Canterbury to demand, in the name of the King, the absolution of the bishops. Becket refused, alleging the necessity of obedience to the Pope. The knights withdrew from the cathedral transept where they were, only to return with an armed following. Becket forbade his attendants to lock the doors, saying, "God's house must be closed against no man." There, by the altar, he was murdered, declaring, "For the name of Jesus and for the defense of the Church I am ready to embrace death." Henry was compelled to make heavy concessions and to do public penance at the martyr's tomb, to avoid the ban of excommunication. The murderers, having repaired to Rome as penitents, were sent on a pilgrimage to Palestine. February 21, 1173, Becket was canonized by Pope Alexander III., and the anniversary of his death was set apart as the yearly festival of Saint Thomas of Canterbury. In 1220 his bones were raised from the grave in the crypt, where they had been hastily buried the day after his murder, and by order of King Henry III, were deposited in a splendid shrine, which for three centuries continued to be the object of one of the great pilgrimages of Christendom, and still lives in English literature in connection with Chaucer's *Canterbury Tales.* At the Reformation Henry VIII. despoiled the shrine, erased Becket's name from the calendar, and, according to a doubtful account, caused his bones to be burned and scattered to the winds.

Bibliography. The best collection of sources for the life of Becket is contained in Robertson and Shepard's (ed.) *Materials for the History of Archbishop Becket,* Rolls Series, 7 volumes (London, 1875-85). These include a number of biographies by contemporaries and a very large number of letters. The best modern work is Canon Morris, *Life and Martyrdom of Saint Thomas Becket* (London, 1885). In addition, see Hook, *Archbishops of Canterbury,* Vol. V. (London, 1860-67); Thompson, *Thomas Becket* (London, 1889); Freeman, *Historical Essays* (London, 1872-79); Stubbs, *Constitutional History* (Oxford, 1891); Hutton, *Saint Thomas of Canterbury* (London, 1889).

BECK'FORD, William (1759-1844). An English author. Born September 29, 1759, he was the son of William Beckford, alderman and twice Lord Mayor of London. When he was about 11 years old, his father died, and he inherited the larger part of a very large fortune, consisting of estates in Jamaica and of Fonthill Abbey in Wiltshire. His annual revenue is said to have exceeded £100,000. Young Beckford evinced unusual intellectual precocity: for before he was 17 years old he composed a satirical essay, entitled *Biographical Memoirs of Extraordinary Painters,* a sort of parody on the usual biographies of eminent artists. In 1777 he went with a tutor to Geneva, where he remained about eighteen months; and in the years succeeding he made tours through Flanders, Germany, Italy, Portugal, and Spain. In 1783 he married Lady Margaret Gordon, daughter of the fourth Earl of Aboyne, and left at once for Switzerland, where they remained till the death of Lady Margaret in 1786. He had already written *Vathek: An Arabian Tale.* Of its composition, which may be assigned to 1781 or 1782, he says: "It took me three days and two nights of hard labor. I never took off my clothes the whole time." This famous romance, written in French and published at Lausanne and Paris in 1787, was translated from the French MS. by Samuel Henley, and published, without Beckford's consent, in London, in 1786. In 1790 Beckford sat in Parliament for Hindon; in 1794 he accepted the Chiltern Hundreds, and again left England. He went to Portugal, purchased an estate near Cintra, and occupied for a time that 'paradise' which Byron commemorated in *Childe Harold.* Tormented by unrest, he returned to England and settled, in 1796, at Fonthill, where he sought to realize the magnificence of his Oriental dreams. He erected a new building at Fonthill, the most prominent feature of which was a tower about 300 feet high. Beckford resided there till 1822, when he was compelled to dispose of the estate and house, with all its curiosities. It was bought by Colonel Farquhar for £330,000. Soon after, the great tower, which had been raised on an insecure foundation, fell to the ground. On the sale of Fonthill, Beckford removed to Bath, and immediately proceeded to erect another lofty building, the plan of which also included a tower, but this time not more than 100 feet high. While residing there, he did not mingle in Bath society, and the most improbable stories concerning the rich and morose genius in their neighborhood were circulated among the citizens, and were believed by them. During all his life, Beckford was a hard-working student, and was devoured by a passion for books. Some of his purchases were perfectly imperial in their way. He bought Gibbon's library at Lausanne, to amuse himself when he happened to be in that neighborhood. He went there; read in the fierce way that he wrote, three days and two nights at a sitting; grew weary of his purchase, and handed it over to his physician, Dr. Scholl. Besides *Vathek* and his youthful essay, Beckford published two sentimental novels and sketches of his travels. Consult: Redding, *Memoir* (London, 1859); and Garnett, *Vathek,* with critical essay (London, 1893).

BECK'MANN, Johann (1739-1811). A German writer on technology and agriculture. He received instructions from Linnæus, and in 1766 he was appointed professor of philosophy, and in 1770 professor of agronomic economy at Göttingen. At that university altogether he taught for more than 40 years. Among his works may be mentioned: *Grundsätze der deutschen Landwirtschaft* (1806); *Anleitung zur Technologie* (1809); *Anleitung zur Handelswissenschaft* (1789); and *Beiträge zur Geschichte der Erfindungen* (1780-1805).

BECK'WITH, James Carroll (1852—). An American portrait painter. He was born at Hannibal, Mo., and studied in Chicago, New York, and with Carolus Duran in Paris. Soon after his return to New York, in 1878, he was elected to the Society of American Artists and the National Academy of Design. He decorated one of the domes of the Manufactures Building at the Chicago Exposition of 1893, but portraiture occupies his chief attention. Mr. Beckwith is a fine draughtsman, and employs intelligently the broad method of his master, Carolus Duran, in his best portrait work. Among his best-known portraits are those of Gen. Schofield, Judge Palmer, Col. Appleton, Mark Twain, and the Ogden and Parish families. At the St. Louis

Exposition he exhibited "The Nautilus" and portraits of Mrs. Beckwith and F. H. Hitch.

BECKX, bĕks, Pierre Jean (1795-1887). The twenty-second General of the Jesuits. He was born at Sichem, in Belgium, and became a member of the Society of Jesus in 1819, and the head of the order in 1853. Quite early his superiors recognized his rare abilities, and sent him on several delicate missions. When Duke Ferdinand of Anhalt-Köthen became a convert to the Roman Catholic religion, young Beckx was appointed his confessor, and officiated for some years as priest of the new church which was built at Köthen. After the death of the Duke, Beckx continued at the court with the widow, the Duchess Julia, whom, at a later period, he accompanied to Vienna. In 1847 he became procurator for the Society in Austria. In the following year the Jesuits were driven from Austria, and Father Beckx went to Belgium, where he was nominated rector of the Jesuit College at Louvain. When the Jesuits were reëstablished in Austria he zealously supported the projects of the Government, which were highly favorable to the interests of the Church. He lent his aid to the Primate of Hungary, Cardinal Szcitowsky, who succeeded in obtaining the reinstatement of the Jesuits in that portion of the Empire, and in founding the novitiate at Tyrnau. He was sent as a delegate to the assembly at Rome in 1853 which was to choose a successor to Father Roothan, and was elected General of the order. The prodigious success of the Jesuits since that time, especially in non-Catholic countries, is due in no slight degree to the ability and foresight of Father Beckx. Besides some minor writings and occasional discourses, he published a *Month of Mary*, which has passed through numerous editions, and has been translated into many languages. He resigned his office in 1884, three years before his death.

BECKY SHARP. The significant name of the chief character in Thackeray's *Vanity Fair*. Endowed with uncommon wit, she has equal audacity, intrigue, and, above all, a calculating temperament by which she determines to rise in the world. She is incapable of love, but marries Rawdon Crawley for his position, which she is obliged to forfeit because of her scandalous relations with Lord Steyne.

BECQUE, bĕk, Henri François (1837-99). A French dramatic author. He was born in Paris, and first became known by his libretto for the opera *Sardanapale* (1867, music by de Joncières). He was a member of the staffs of several journals, was for a time a banker, and as playwright met with varying fortunes, his *Michel Pauper* (1870) and *L'enlèvement* (1871) being failures, while his *Parisienne* (1885) achieved decided success.

BECQUER, bå-kâr′, Gustavo Adolfo (1836-70). A Spanish poet, born at Seville, the son of the genre painter, Joaquin Becquer. An orphan at 10, he was brought up by his godmother, whose favor he lost by refusing to adopt a regular profession. At 18 he came, penniless, to Madrid, where he earned a precarious living by journalistic hack-work and by translating foreign novels, and where, after a fruitless struggle of fifteen years, he died. He left three volumes, made up of poems and prose legends. The latter, of which the best known is *Leyendas españolas*, are weird, morbid tales, strongly reminiscent of Hoffman, just as his poems are reminiscent of Heine, though lacking Heine's inimitable irony, and imbued with mysticism. His collected works (Madrid, 1885) have a biographical introduction by Correa.

BECQUEREL, bĕk′rĕl′, Alexandre Edmond (1820-1891). A French physicist, son of Antoine César Becquerel. He was born in Paris, and inherited the scientific tastes and talents of his father, whom he assisted in many of his investigations. He was elected a member of the Academy of Sciences of Paris in 1863, and in 1878 succeeded his father as professor of physics in the Conservatoire des Arts et Métiers. In addition to coöperating with his father, he carried on a number of experiments in electricity and light, particularly in phosphorescence, an instrument known as the phosphoroscope having been invented by him. He is also well known for his work on the solar spectrum and the spectrum of the electric light. In addition to a large number of scientific papers published in French journals, Edmond Becquerel was the author of *La lumière, ses causes et ses effets* (1867), and, in coöperation with his father, of *Eléments de physique terrestre et de metéorologie*, and other works.

BECQUEREL, Antoine César (1788-1878). The first of several generations of distinguished French physicists. He was born at Châtillon-sur-Loing, in the Department of Loiret. In 1808 he entered the French Army as an officer of engineers, and served with distinction in Spain under Marshal Suchet. On his return to France he was appointed inspector of the Ecole Polytechnique, and after serving in that capacity and with the general staff of the army, at the Peace of 1815 retired from active service to pursue scientific studies. He became professor of physics at the Museum of Natural History in Paris in 1837. His attention was principally devoted to electricity and magnetism, and among his researches are many important discoveries. While studying the physical properties of yellow amber Becquerel had occasion to make experiments on the liberation of electricity by pressure. This led him to investigate the laws governing the production of electricity by chemical action. The result of his study was the overthrow of Volta's theory of contact, and the construction by him of a constant cell. The production of a current by contact between different pieces of the same metal and the determination of the resistance of various liquids and atmospheric electricity were also investigated, and he was greatly interested in meteorology and thermo-electric apparatus. He also discovered a method of determining the internal temperature of human and animal bodies, and in physiological investigations demonstrated that when a muscle contracts there is a development of heat. Becquerel may be considered one of the creators of electro-chemistry. His labors in this branch of science secured for him election to the Paris Academy of Sciences. After 1828 he applied electro-chemistry in the reproduction of mineral substances and in various electrolytic processes. In 1837 he was elected a member of the Royal Society of London, and received the Copley Medal. Among his works, in several of which he had the coöperation of his son, Alexandre Edmond, were the *Traité de l'électricité et du magnétisme* (1855); *Elément d'électrochimie* (1843); *Traité de physique* (1842); *Eléments de physique terrestre et de météorologie* (1847); *Résumé de l'histoire de l'électricité et du magnétisme* (1858).

BECQUEREL, Antoine Henri (1852—). A French physicist. He was the son of Alexandre Edmond Becquerel, and was born in Paris. He was educated at the Ecole Polytechnique and the Ecole des Ponts et Chaussées, from which he graduated as an engineer in 1877. He became professor of physics in the Museum of Natural History in 1878, and in 1895 occupied a similar chair at the Ecole Polytechnique. He was admitted to the Institute in 1889, and is considered one of the greatest living physicists. His researches have dealt mainly with such optical subjects as the rotation of polarized light by a magnetic field, phosphorescence, spectroscopic studies, and most important, the invisible radiation from uranium, to which the name of Becquerel rays have been given. For this discovery he received the Rumford Medal of the Royal Society of England.

BECSE, běch'e, (or Ó-Becse, Old Becse; called also Szerb-Becse, Serb Becse). A town of Hungary, in the county of Bács-Bodrog, on the right bank of the Theiss, near its junction with the Franzenskanal (which connects it with the Danube), 45 miles south of Szegedin (Map: Hungary, G 4). It carries on an extensive trade in grain. Population, in 1900, 18,865, mostly Magyars. New, or Turkish, Becse (Uj-Becse or Török Becse) is situated on the left bank of the Theiss, in the county of Torontál, 5 miles below Becse proper. It has trade in fruit and grain. Population, in 1890, 7000.

BECSKEREK, běch'kě-rěk. Two towns in Hungary. (1) Great Becskerek (Hung. *Nagy-Becskerek*). The capital of the County of Torontál, situated on the Bega, about 45 miles west-southwest of Temesvár, with which it is connected by canal. It is a busy market-town, with a considerable grain and cattle trade. The cultivation of silkworms is an important industry. Population, in 1890, 22,000, one-third of whom are Germans, about an equal number Serbs, and only about one-fourth Magyars. (2) Little Becskerek (Hung. *Kis-Becskerek*), a town in the County of Temes, about 9 miles northwest of Temesvár. Population, in 1890, 3687, mostly German Roman Catholics.

BED (AS. *bed*, *bedd*, Icel. *besr*, Goth. *badi*, OHG. *betti*, Ger. *bett*, all from the root *bhodh*, preserved in Lat. *fodire*, to dig. Originally, an excavated spot, a dug-out place, a lair). This term originally indicated, in all Germanic languages, the litter (cf. French *lit* = bed), on which a person slept. Then it was used to include the frame or shelf on which the bedding was placed, the bedstead. In the ancient Orient there was little difference between the bed and the couch on which persons reclined during the day. In Egypt the frames were sometimes high, and were reached by a stool or short steps; they were supported on curved legs, ending in claw feet, and were of graceful lines, with a slightly raised headboard, a mattress and a wooden pillow, or head-rest. Sometimes the mattress or bedclothes were supported by a wicker-work of palm-branches. The beds of the Babylonians and Assyrians were more luxurious. Beds of ivory, gold, and fine woods were enumerated in the Amarna tablets among the objects sent from Syria to the kings of Egypt. A British Museum relief shows King Assurbanipal reclining at dinner on a magnificent couch, while his queen sits in an armchair. Sometimes the bedding was placed in a recess on a raised slab, as in the Palace of Sargon, at Khorsabad, without any bedstead. The prevalence of insects in the East soon led to the use of canopies, baldachins, and mosquito-nettings. There was one over the bed of Holophernes in his tent. These Asiatic beds were sometimes portable, sometimes stationary. The Persians are supposed to have been the first to make up a bed not only comfortable but beautiful to see, though it is probable that they inherited their taste from the Babylonians. Their great men carried beds even on campaigns, for Herodotus mentions some abandoned by Mardonius in his sudden flight. Such beds were incrusted with gold and silver and covered with magnificent stuffs. The Jews could hardly have equaled this magnificence; still several interesting passages in the Old Testament illustrate their various uses. In receiving visitors the King bowed himself upon the bed (I. Kings i. 47); in Prov. (vii. 16) the bedding is described: "I have decked my bed with coverings of tapestry, with carved works, with fine linen of Egypt." The Homeric poems mention the three main classes of early beds: the shake-down, the portable bed, the heavy bedstead, sometimes a fixture.

Greek Beds. The *Odyssey* (xxiii. 190) describes the bed made for himself by Ulysses. The trunk of the olive tree around which he built and roofed his chamber was trimmed and used as one of the bedposts, the frame being made by the addition of three more feet and the connecting frame; the whole was inlaid with gold, silver, and ivory. The bedding was supported on leather straps, and on top of it were blankets to make it softer. At that time there seem to have been no stuffed mattresses. The Greek bedsteads of historic times were at first less gorgeous, being usually made of maple or boxwood, solid or veneered. But the custom of not sitting, but reclining at table on couches, led to a gradual increase in decorative beauty in the Sixth Century B.C. Even then the Asiatics did not think that the Greeks knew how to make a comfortable bed; and when the Persian King Artaxerxes gave a bed, with all its magnificent appurtenances, to the Athenian Ambassador Timogoras, he gave also a number of attendants skilled in preparing it. While the poor continued to use the primitive litter or the skins of animals for bedcovers, the wealthy became more and more fastidious in the use of bed-covering and ornament. Miletus, Corinth, and Carthage became famous centres in the dyeing, weaving, and embroidering of bedcovers, and the bedsteads and couches were inlaid or veneered with ivory, tortoise-shell, and precious metals, and even provided with feet of solid silver or gold. There was a class of bedmakers at Athens.

The form of Greek bedsteads and bedding at different times is illustrated not only by numerous vase paintings, but by some marble beds found at Palatitza and Pydna, and a terra-cotta bed from Tanagra. The common elements were: (1) a wood frame; (2) a vegetable trellis for spring; (3) a mattress covered with striped or figured linen, or woolen cloth, or leather, stuffed with dried reeds, or wool, or the fluffy product of the *gnaphalion;* (4) pillows, one round, and two or more square, covered with linen and filled with down or feathers; (5) bedcovers of various kinds, brilliantly colored, embroidered with floral and animal patterns, some of heavy woolly cloth, some of lighter texture. The bedstead had posts sometimes square, sometimes round (turned), crowned usually by an Ionic capital and of graceful design. Sometimes they were in the form of columns, sometimes they were turned in a succession of slender necks and swelling bulbs. The frame itself was narrow, the footboard was seldom raised, but the headboard commonly projected above the bed. There appears to have been, during the Fifth Century, a reaction toward a more Spartan simplicity in bed and bedding—due, perhaps, to the fall of Athenian supremacy; but it did not last long, and the Alexandrian Age saw an even greater Oriental luxury among the Greeks.

Roman Beds. In Italy the Etruscans led in love of luxury, and their beds, as shown in the paintings and reliefs of their tombs, were of the same type as the Greek, with the added comfort of air-cushions. Two funeral bedsteads, veneered in ivory, have been found in Etruscan tombs of the Fourth and Third centuries B.C. One is in the Papa Giulio Museum, Rome; the other in the Field Museum, Chicago. They are covered with fine carvings in relief. But it was not until the close of the Republic that the Romans laid aside their simplicity and combined all the good points of Etruscan, Greek, and Oriental beds. There were five classes of Roman beds and couches—(1) the ordinary sleeping-bed, or *lectus cubicularis;* (2) the reclining-table couch, or *lectus tricliniaris;* (3) the smaller lounge for rest and meditation in the daytime—the *lectulus;* (4) the high marriage-bed—*lectus genialis;* and, finally, (5) the funeral-bed, or *lectus funebris,* on which the deceased was exposed and carried in the funeral procession. There were bedsteads of massive bronze, beautifully decorated; as, for example, that found at Pompeii, with silver incrustations. Others were of massive silver, even of gold, while the majority were veneered with expensive woods, tortoise-shell, or ivory, plates of gold or silver, or gold-leaf, or else inlaid in patterns with different materials. The typical Pompeian ordinary bed is very similar to the modern wooden bedstead in its proportions and structure. Some frames were high, and were reached by footstools. Not only were there usually both headboard and footboard, but also in the sleeping-beds the back was often protected by a board. In all these particulars it varied from the Greek bed. The mattress rested either in girth or on a delicate diagonal trellis, and was for the poor stuffed with straw or dried reeds, and for the rich with wool, or even feathers. The pillows were of feathers or down. The bedcovers were rich in color—especially purple embroidered with gold—and made of Oriental stuffs.

Beds in the Far East. The Roman inheritance, lost in the West after the Sixth Century A.D., was continued in the Byzantine Empire, and the gorgeous couches and lounges in the Imperial palaces at Constantinople are famous. The Mohammedans inherited both the Byzantine and the Persian forms of luxury, and while not paying so much attention to the bedcovers, which, on account of the warm climate, were necessarily light, developed the magnificence of the baldachins and other hangings over the beds and couches to such an extent that these woven and embroidered stuffs, damasks, velvets, etc., became the masterpieces of their class, and were among the most regal presents. The Crusaders became acquainted with them and introduced them into the West. In Farther Asia beds and bedding have been and still are of great simplicity, usually in the form of simple couches or mattresses, which can be easily rolled up or carried away. In India they are called charpoys. The Japanese lie upon matting with wooden neckrests—a custom derived ultimately from Egypt. The Chinese use low beds, often elaborately carved.

Beds in the Middle Ages. Meanwhile, in the West, bedsteads, though reduced to extreme simplicity, with the fall of Roman civilization had not entirely fallen into disuse. In the time of Charlemagne they were sometimes made of bronze tubing—like our own brass bedsteads, with bulbs at the joints and ends of the posts—with a rope netting to support the mattress and with numerous large pillows. In the crusading times of the Twelfth Century the beds acquired considerable richness; the frames were low and narrow, and of almost Spartan simplicity, there being no headboard or footboard, and only posts projecting slightly above the frame. These frames were, however, richly inlaid, carved, or painted, were covered with embroidered hangings and overhung with canopies. As in the Carlovingian Age, the bedding was arranged on a very inclined plane, so now the mattresses appear much longer than the frame, raised over the low headboard and suspended on a curve. With the advent of the Gothic Age in the Thirteenth Century, and the Golden Age of the manor-life of the castles, beds increased still further in size and luxury. The marriage-beds stood often not in a special bedroom, but in the main hall, where all persons could enter, and were entirely curtained about. Metal bedsteads had been entirely abandoned in favor of wood. The balustrade became wider, and had an opening in the middle of the front side for entrance; the height of the headboard was increased; the mattress was laid flat, inside the frame instead of on top of it, and the number of pillows was increased.

In the Fourteenth Century the bedsteads decreased in size but increased in comfort, in fineness of linen sheets and richness of coverings. They were placed in bedrooms, which were now sumptuously decorated with hangings. There were often two mattresses instead of one, and they were covered with silk. Previously the sheets had been used to wrap the person in—as nightgowns were almost unknown—but now the sheets were larger and fell over the sides of the bed, even to the ground, under the sumptuous covers.

Later European Beds. In the Fifteenth Century their size became enormous, 7 feet long by 6 feet or more wide. The rooms were so large, however, that, as heretofore, the bedsteads were headed to the wall, and sometimes there were two side by side, and 4 or 5 feet apart, covered with a single immense canopy, as in the beds of Isabelle de Bourbon. The beds of Henry II. and Francis I. were famous, and the kings began to hold receptions in bed. The canopies were of all sizes and shapes, and suspended from the ceiling or wall. But in the Sixteenth Century columns came into use to support them, and the four-poster was created. Heavier stuffs became the rage for covers and hangings, velvets, brocades, and damasks. The bedsteads were heavily carved, and the headboards were often solid to the top of the canopy. The heaviest made were the English Elizabethan beds of oak —immense structures. Considerably lighter were the oak frames of Flanders. In France and Italy the ordinary fine bed was of carved walnut. In the Seventeenth Century the mode in France became lighter, with great use of laces and gauzes and of figured tapestries. That century was preeminently that of beautiful beds, never equaled before or since. The inventories of Louis XIV. show that this monarch had an unrivaled collection of 413 superb bedsteads of all forms—four-posters, pavilioned, duchesse, imperial, *en housse, à pentes,* etc. This museum of beds in the Garde-Meuble was the wonder of all visitors. The reign of Louis XV. added only a more delicately fantastic ornamentation to this age of graceful design and varied coloring. The kings, queens, ministers, great ladies, and the high nobility commonly held early receptions in bed; there was the *petit lever* and the *grand lever.* (See LEVEE). The *ruelle* was the narrow space between the wall and the head of the bed, where a person could stand concealed. This importance given to the bed insured the magnificence of every detail. The Empire beds, in mahogany, with bronze trimmings, are comparatively monotonous and heavy. The Colonial beds are a simplification of the heavier English four-poster. At present many types are used, but even the finest bedsteads made are commonplace compared with the best of the past four centuries.

MODERN BEDS. Throughout the Continent of Europe beds are of the open couch form, suitable in width for one person. They consist of a frame or bedstead, bearing one or two hair or wool mattresses; they are often provided with curtains, hanging from the ceiling. In Germany there is a common practice of placing large, flat bags of down above the other coverings of beds for the sake of warmth, and sometimes a bed of down altogether supplies the place of blankets. In Italy corn-husk mattresses are very common. Throughout America the beds are usually of the French, or open couch form. The simplest kind of bed yet invented—except, indeed, the Oriental rug spread on the floor—is one frequently to be seen in America. The bedstead consists of a folding trestle called a cot, constructed with canvas on the principle of a campstool, with a movable headboard at one end to retain the pillow. Its great advantage consists in its being easily folded up and put away in small space. Another device for saving space is the 'folding bed' proper, which is often constructed so as to resemble when closed a bookcase or some other piece of furniture. Such beds are useful where a bedroom must serve also for a sitting-room; but there are many objections, both æsthetic and sanitary. In America the English practice of providing a double bed instead of the Continental custom of furnishing a separate bed for each person prevails, although, largely for hygienic reasons, the single bed has become common. The English four-posted bed, or family bed, is a gigantic piece of furniture, having a roof or canopy supported by the four posts, which are generally of mahogany, and finely turned and carved. On rods along the cornice hang curtains which can be drawn around the sides and foot. Lower wooden beds and beds of brass or iron have largely supplanted the old-fashioned four-poster, and are popular on account of their cleanliness and cheapness. See FURNITURE.

BED, or STRA'TUM. In geology, a layer or a number of layers of stratified sedimentary rock, with an approximately uniform lithological character. If shale, sandstone, and limestone succeed one another in layers, each forms an independent bed, or stratum; again, if a thick sandstone be composed of a number of layers, each of these layers, or certain groups of them, may be called 'beds,' or 'strata.' While most geologists confine the terms to layers of uniform vertical composition, there is a lack of uniformity in usage as regards the number and thickness of the layers to be included under them. For instance, 'stratum' is sometimes used as above defined, while 'bed' is applied to each of the constituent layers. Again, 'bed' and 'stratum' are used in the same sense either for a group of layers or for a single layer. The occurrence of sedimentary rocks in layers is described as 'bedding' or 'stratification.' The cause of stratification is the intermittent supply of materials for deposition, due to such causes as varying intensity of wave-action, tides, or irregular deposition from rivers. When the stratification is obscure it would seem to indicate that the materials had been supplied with little or no intermission. The individual particles of strata or beds are laid down in such a way that they tend to oppose their broader sides to the greatest stress acting upon them, which is compounded of gravity and the stress of moving water. The result is a general arrangement of the greater diameters of the mineral particles in planes parallel to the planes of bedding or stratification. See LITHOGENESIS; STRATIFICATION.

BEDAMAR, bā'dȧ-mär'. A noble Spaniard in the *Conjuration des Espagnols contre la république de Venise* of Saint-Réal. The character reappears as one of the conspirators in Otway's *Venice Preserved.* He meets death by being broken on the wheel.

BED'BUG'. A reddish-brown, flattened, wingless, nocturnal insect (*Acanthia* or *Cimex lectularia*) peculiar to the fixed habitations of man, and subsisting by sucking his blood. It represents a family Acanthiidæ, or Cimicidæ, of heteropterous bugs (Hemiptera), which, with numerous allied forms, live upon the juices of plants and animals; and this parasitic life has caused degeneracy, until now this species has acquired a very flat body, capable of hiding in narrow cracks, and has completely lost its wings; it has also gained the power of resisting great cold, and of fasting indefinitely, so that it easily survives long intervals between tenants in a house—a fact which often accounts for an otherwise mysterious appearance of the pest. Its mouth consists of a three-parted proboscis, which can be thrust through the skin like a hollow needle, and then becomes a blood-pump. The parasite hides by day in cracks and crevices of floors, walls, and furniture, frequenting beds especially, simply because there it gets its living at night. The eggs of the bedbug are minute, whitish oval objects, laid in clusters in the crevices used by the bugs for concealment, and hatch in about 8 days, the young being almost transparent 'nits,' which grow darker in color as they increase in size, until, when full-grown, they may be a quarter of an inch long. This growth is attained by means of five molts, and if food and warmth be plenty, maturity may be attained in three months; but under adverse conditions growth may be greatly prolonged. A female may lay several packets of eggs and several broods be raised each year, so that under favorable conditions (slovenly housekeeping) the multiplication is extremely rapid. These insects have been known as house-pests from the earliest times, and it is believed came originally from India. Aristotle alleged that they arose spontaneously from sweat. Their spread is mainly due to their being carried from place to place in furniture, vehicles, and clothing. They do not seem to have reached England previous to the Seventeenth Century; at any rate, to a notable extent, since the word 'bug,' which now designates this pest primarily in British speech, is not so used in Shakespeare's writings. America received it from Europe, and ships have now spread it all over the world. There is a popular belief that it dwells in the woods under bark of decaying timber, and also that it infests certain other domestic animals, especially poultry. That it may sometimes prey upon other animals is possible; but entomologists believe it to be restricted to humanity, and that all the similar bugs (see Cone-nose) found upon bats, swallows, pigeons, and poultry are other species peculiar to each of those animals, and not attacking men. Certain bird-lice have a deceptive resemblance, also, to the Cimicidæ. Bedbugs are eaten by various predatory insects, especially cockroaches.

The remedy lies in persistent and minute cleanliness. "The application," says Osborn, "of the common remedies, such as benzine, corrosive sublimate, kerosene, and hot water, will usually suffice to rid an ordinary dwelling of these pests; but in larger buildings, probably nothing is more effectual than thorough fumigation with sulphur, brimstone, or perhaps bisulphide of carbon. . . . For immediate relief in a sleeping-room, pyrethrum is most available, since it can be used while a room is occupied. Dusted between the sheets of a bed, it will protect the sleeper from the most voracious hotel bug." Consult Osborn, *Insects Affecting Domestic Animals* (United States Department of Agriculture, Washington, 1896). See Bug.

BED'CHAM'BER, Lords of the. Officers in the British royal household, twelve in number, who wait in turn upon the sovereign's person. The salary is £1000. These offices in the reign of a queen are performed by ladies. Queen Victoria usually had from ten to twelve ladies, and extra ladies of the bedchamber, and eight bedchamber women. These offices are objects of high ambition, from the access they give to the person of the sovereign, and are for the most part filled by 'the prime nobility of England.' They are usually vacated at each change of ministry. On Victoria's departure from the usual etiquette in 1839, Sir Robert Peel declined to form a ministry, and Lord Melbourne returned to office. The incident caused some excitement, and is amusingly known as 'The Bedchamber Plot.' Consult Armytage, *Old Court Customs and Modern Court Rule* (London, 1883).

BED'DARD, Frank Evers (1858—). An English zoölogist, born at Dudley. He studied at New College, Oxford, was naturalist to the *Challenger* Expedition Commission in 1882-84, and assistant editor in the preparation of the reports of the expedition. For a time he was examiner in zoölogy and comparative anatomy at the University of London, and lecturer on biology at Guy's Hospital. In 1884 he was appointed prosector of the Zoölogical Society of London. His publications include: *Animal Coloration* (1892); a *Monograph of the Oligochæta* (1895); a *Text-book of Zoögeography* (1895); and *Structure and Classification of Birds* (1898).

BEDDOES, bĕd'ōz, Thomas (1760-1808). An English physician and author. He was born in Shropshire, was educated at Oxford, and studied medicine in Edinburgh and London. He was appointed lecturer on chemistry at Oxford in 1788, but his unconcealed sympathies with the French Revolution rendered his post uncomfortable, and he resigned in 1792. Retiring into the country, he then wrote his *History of Isaac Jenkins*, a moral tale, in which he laid down, in a popular style, rules of sobriety and health for the benefit of the working classes, and which soon became exceedingly popular. He established in 1798 a 'pneumatic institute' at Clifton, for the treatment of disease by inhalation. It did not succeed, but is memorable as having introduced to the world Humphry Davy (q.v.), who was for some time its superintendent. Beddoes settled in London in 1801, where he published his *Hygeia*, a collection of popular essays on medical subjects. Consult the *Life* by Dr. Stock (London, 1811).

BEDDOES, Thomas Lovell (1803-49). An English dramatist. He was born at Clifton, July 20, 1803. His father was the distinguished physician, Thomas Beddoes (noticed above). His mother was a sister of Maria Edgeworth, the novelist. In 1808 Dr. Beddoes died, leaving his son to the guardianship of Davies Giddy, afterwards Sir Davies Gilbert, president of the Royal Society. Young Beddoes was placed at the Bath Grammar School; from thence, in 1817, he removed to the Charterhouse, and in May, 1820, he entered a commoner at Pembroke College, Oxford. In 1821 he published the *Improvisatore*. On this volume he looked with no favor at a later period, and was accustomed to destroy stray copies wherever he could find them. In 1822 he published *The Bride's Tragedy*, a work of great promise. In 1825 he went to Göttingen to study medicine, and from this time forth continued to live in Germany, with occasional visits to England. While engaged at Frankfort (1848), in dissecting, he received a slight wound, which was the means of infusing a noxious virus into his system. Under most distressing circumstances, he committed suicide at Basel, January 26, 1849. During his wanderings in Germany, Beddoes was engaged at intervals in the composition of a drama entitled *Death's Jest-Book*. This work, together with his other manuscripts, consisting chiefly of poetry, he left to his friend, T. F. Kelsall. In 1850 this friend published *Death's Jest-Book*, and in 1851 the collected poems of Beddoes, with an excellent memoir. Beddoes is chiefly known by this posthumous play, which is a tragedy conceived in the manner of Webster and Tourneur, the late Elizabethans, who dealt in the terror and pageantry of death. The blank verse is good, and scattered through the play are many songs recalling the ease and freshness of Shakespeare. Consult: *Poetical Works* (London, 1890) and *Letters* (London, 1894), both edited by Gosse.

BEDE, bēd, or **BÆDA**, bē′dȧ, surnamed The Venerable (c.673-735). The greatest name in the literature of Saxon England, and probably the most distinguished scholar of his age. The exact spot of his birth is a point in dispute among antiquarians, but is commonly believed to have been in what is now the parish of Monkton, near Wearmouth, in Durham. In his seventh year he entered the neighboring monastery of Saint Peter, at Wearmouth, where he was educated under the care of the Abbot Benedict Biscop, and his successor, Ceolfrith. His instructor in the Scriptures was Trumberht. After studying for a time at Wearmouth, Bede removed to the twin monastery of Jarrow, founded in 682; here he took deacon's orders in his nineteenth year, and was ordained priest in his thirtieth by John of Beverley, then Bishop of Hexham. In the shelter of his quiet and sacred retreat, Bede devoted himself to the pursuit of literature such as it was possible in those days. He studied Latin and Greek, and had at least some acquaintance with Hebrew, astronomy, and prosody. He wrote homilies, lives of saints, hymns, epigrams, works on chronology and grammar, and comments on the books of the Old and New Testaments. His own list of what he had written up to 731 is given in his *Ecclesiastical History*, and contains thirty-seven titles. His calm and gentle spirit, the humanizing character of his pursuits, and the holiness of his life, present a striking contrast to the violence and slaughter which prevailed in the whole island. To none is the beautiful language of Scripture more applicable —"a light shining in a dark place." When laboring under disease, and near the close of his life, he engaged in a translation of the Gospel of Saint John into Anglo-Saxon, and dictated his version to his pupils. He died May 26, 735, and was buried in the monastery of Jarrow; long afterwards (in the middle of the Eleventh Century) his bones were removed to Durham. His most valuable work is the *Historia Ecclesiastica Gentis Anglorum*, in five books, to which we are indebted for much of our information on the history of England down to A.D. 731. Bede drew the materials for his work partly from Roman writers, but chiefly from native chronicles and biographies, records, and public documents, and oral and written communications from his contemporaries. King Alfred translated the work into Anglo-Saxon.

In chronology the labors of Bede were important, as he introduced the Dionysian reckoning of dates in his work, *De Sex Ætatibus Mundi*, which served as a basis for most of the mediæval chroniclers of leading events in the world's history. Among the many editions of Bede's history may be noticed: the sixth, published at Strassburg about 1500; much better editions by Smith (Cambridge, 1722); and one by Stevenson (London, 1838); more recent editions are those of Dr. Hussey (Oxford, 1846), Moberly (Oxford, 1869), and Dr. Giles in his edition of the whole works of Bede, with an English translation. There are at least thirty-four editions in all. Entire editions of Bede's writings have been published at Paris (1544-54); Basel (1563); and Cologne (1612 and 1688); London (1843-44); and Migne's *Patrologiæ* (Paris, 1844). English versions of his *Ecclesiastical History* have been published by Stapleton (1565); by Stevens (1723); by Hurst (1814); by Wilcock (1818); by Giles (1840); by Stevenson (1852); by Gidley (1870), etc. See publications of the Bohn Library. Consult: Gehle, *De Bedæ Venerabilis Vita et Scriptis* (Leyden, 1838); and, for his biography, G. F. Browne, *The Venerable Bede* (London, 1880).

BEDE, bēd, Adam. The hero of a novel of the same name by George Eliot. He is a young carpenter, whose character is said to be partially drawn from that of the father of George Eliot.

BEDE, Cuthbert. See Bradley, Edward.

BEDEAU, be-dō′, Marie Alphonse (1804-63). A distinguished French general, born at Vertou, near Nantes. In the Belgian campaign of 1831-32 he was aide-de-camp to General Gérard. In 1836 he was sent to Algeria, as commandant of a battalion of the Foreign Legion. Here he acquired his military reputation. He took part in most of the operations by which the dominion of France was established over the natives, and rose to the rank of general of brigade. In 1847 he was for a short time Governor of Algeria, but was superseded by the Duc d'Aumale. When the Revolution of February broke out, Bedeau, who was in Paris on leave of absence, was commissioned by Marshal Bugeaud to suppress the insurrection. This he found it impossible to do. By the Provisional Government he was appointed minister of war, an office, however, which he immediately changed for the command of the city of Paris. He was elected to the Constituent Assembly, and was made vice-president of it, always voting with the Republican party. Along with Cavaignac, Lamoricière, and others, he was arrested on December 2, 1851, and went into exile. He died in Nantes.

BEDEGUAR, bĕd′ē-gär (Fr., from Ar., Pers. *bādāwar*, a kind of white thorn or thistle). A large, roundish excrescence, or gall, sometimes called sweetbrier sponge, produced by the *Rhodites rosæ*, a gall-fly, on various species of rose. The excrescence is caused by a peculiar poisonous fluid injected by the fly into the plant-tissue; externally mossy, it contains the larvæ of the insect, and the juices of the plant, on which they feed. It was once popularly believed to produce sleep.

BEDELL′, Frederick (1868—). An American physicist, born in Brooklyn, N. Y. He graduated at Yale in 1890, and afterwards took a scientific course at Cornell (1890-92), where he received the degrees of M.Sc. and Ph.D. In 1892 he became assistant professor of physics at Cornell. He has made valuable investigations in alternating currents of electricity. He is the author of several works on electricity, and is the editor of the *Physical Review*.

BEDELL, Gregory Thurston (1817-92). An American clergyman, the third Protestant Episcopal Bishop of Ohio, and a member of the evangelical school of his Church. He was born at Hudson, N. Y., the son of Rev. Dr. Gregory Townsend Bedell, and was educated at Bristol College, Pa., and at the Virginia Theological Seminary. He was rector of the Church of the Ascension, New York City, from 1843 to 1859, when he was chosen Assistant Bishop of Ohio. In 1873, on the death of Bishop McIlvaine, he became bishop, and the following year consented to the division of his diocese by the formation of the new jurisdiction of Southern Ohio. He resigned in 1889. His numerous works include *The Pastor* (1880) and *Centenary of the American Episcopate* (1884).

BEDELL, William (1571-1642). A prelate of the English Church, born at Black Notley, Essex. He was educated at Emmanuel College, Cambridge, and after his ordination, in 1602, officiated as a clergyman at Bury Saint Edmunds. In 1607 he accompanied Sir Henry Wotton as his chaplain to Venice. There he resided about four years, deeply engaged in study, and honored by the friendship of many distinguished men, in particular of Fra Paolo Sarpi, then engaged in the composition of his celebrated *History of the Council of Trent*. While residing here, he translated the English Common Prayer Book into Italian, which was highly appreciated by many of the Venetian clergy. On his return home he resumed his pastoral duties at Bury, where he lived for some time in such retirement that when his friend Diodati came to England, he inquired in vain for the admirable Bedell, whose merits were so well known in Venice. He had given up hopes of finding him, when one day he encountered him in the streets of London. In 1616 Bedell was presented to the living of Horningsheath, a neighboring parish to Bury. His retired life and his Calvinistic theology long hindered the recognition of his merits. At length, in 1627, he was unanimously elected provost of Trinity College, Dublin, to which the fame of his learning and piety had extended. He refused to undertake the charge till positively commanded by the King. At the end of two years he was promoted to the united bishoprics of Kilmore and Ardagh, the latter of which he resigned in 1633. While in this diocese he removed his lay chancellor, and took upon himself the ancient episcopal jurisdiction of hearing and deciding causes. His wisdom, firmness, and charity forced even his enemies to revere him, and when the rebellion of 1641 broke out his was the only English house in the county of Cavan that was spared. Refusing to dismiss his flock, he was imprisoned for a time, and on being released ministered at a private house till his death, at Drumlor, February 7, 1642. The Old Testament was translated into Irish under his direction, and besides some other works, he translated the last two books of Fra Paolo's history. His biography was written by his son William, and this was afterwards edited by T. W. Jones (London, 1872). Consult also Burnet, *Life of Bishop Bedell* (London, 1685).

BEDELS, bē'd'lz, or **BEDELLS** (Ger. *Pedell;* see Beadle). One of the most ancient of academic officials, an attendant on the rector and the university crier. Besides the university bedel, there were bedels for the different faculties, 'nations,' and often for the doctors of the university. In Oxford University there are at present four bedels. The senior bedel registers matriculations, gives due notice to those who are to preach before the university, attends such preachers to and from the university church, acts as private secretary to the vice-chancellor, and gives his whole time to the service of the university. One of the sub-bedels constantly attends the vice-chancellor. The other bedel and sub-bedel attend at university sermons, at congregations, the admission of proctors, and all state occasions. All wear a round cap and particular form of gown, and must be constantly resident in the university. At Cambridge University there are two similar officers called esquire bedels, who attend the chancellor (or in his absence the vice-chancellor), preceding him with their silver wands on all occasions, and among other duties see that the university ceremonies are maintained, and that public business is conducted in proper form.

BEDESMAN, bēdz'man. See Bead.

BED'FORD (corrupted from AS. *Bedican ford*, protected ford). The county town of Bedfordshire, England, situated on both sides of the Ouse, here crossed by two bridges and navigable to the sea, about 45 miles north-northwest of London, and in the midst of a broad expanse of rich pasture and agricultural lands (Map: England, F 4). The town is clean, well paved, and shows in its outward appearance and in the number of its municipal undertakings the progressive spirit of its citizens. It was incorporated in the reign of Henry II. It sends one member to Parliament. It has an excellent water-supply, which nets it a substantial profit, and has established an electric-light plant. It maintains several parks and recreation-grounds, public markets, and a cemetery. It is chiefly famed for its charitable and educational institutions, which are largely due to the beneficence of Sir William Harpur, Lord Mayor of London in 1561, who founded a free school and endowed it with 13 acres of London land. The enormous increase in the value of the property (from £40 to £15,000 or upward a year) enables the trustees to maintain grammar, modern, and preparatory schools for boys, the same class of schools for girls, and also almshouses. The most important manufacture of Bedford is that of ironware, especially agricultural implements. Lace-making and straw-plaiting employ many poor women and children. A considerable traffic in malt, timber, coal, and iron is maintained. Population, in 1891, 28,023; in 1901, 35,144. Bedford is of great antiquity, and is mentioned in the Saxon Chronicle under the name of Bedicanford, as the scene of a battle between the Britons and Saxons in 571. It suffered much from the Danes in the Eleventh Century. John Bunyan was born in the neighboring village of Elstow, and while a prisoner in the town jail, as a disturber of the peace, he wrote his *Pilgrim's Progress*. A bronze statue of him presented to the town by the Duke of Bedford adorns Saint Peter's Green. Consult Porter, *An Historical Sketch of Bedford, England* (Boston, 1891).

BEDFORD. A picturesque village of Halifax County, Nova Scotia, Canada, at the head of the beautiful Bedford Basin, nine miles north of Halifax, on the Intercolonial Railway. It is a favorite summer resort of the Haligonians. Population, estimated, 1500.

BEDFORD. A town of Missisquoi County, Quebec, Canada, on the Canadian Pacific Railway, seven miles north of Lake Champlain. It has manufactures of agricultural implements, needles, gloves, and color-works. Population, in 1891, 1571; in 1901, 1364. UPPER BEDFORD, an eastern suburb, has a population of 600.

BEDFORD. A city and the county-seat of Lawrence County, Ind., 75 miles northwest of Louisville, Ky.; on the Baltimore and Ohio Southwestern, the Evansville and Richmond, and the Chicago, Indianapolis, and Louisville railroads (Map: Indiana, C 4). It is noted for its extensive quarrying interests, the building-stone being shipped in considerable quantity over a wide field. There are also railroad shops and roundhouses, large veneering-mills, etc. The city has a public library of 5000 volumes, and many of its buildings, both public and private, are fine stone structures. Population, in 1890, 3351; in 1900, 6115.

BEDFORD. A borough and the county-seat of Bedford County, Pa., 94 miles west by south of Harrisburg, on the Pennsylvania Railroad (Map: Pennsylvania, C 4). Bedford has manufactures of some importance, and contains features of scenic and historic interest, notably Washington's headquarters, the old courthouse, the soldiers' monument, and the picturesquely located Bedford Springs, a popular summer resort. Bedford, originally called Raystown, was settled about 1756, and was laid out in 1766. For many years it was an important frontier military post, and for a time in 1758 was occupied by a large force under General Bouquet; while in 1794, during the Whisky Rebellion, it was the headquarters of the troops under Gen. Henry Lee, sent against the insurgents. Bedford was incorporated in 1817; its charter of that date, still in operation, provides for a mayor, elected every three years, and a borough council. The waterworks are owned and operated by the municipality. Population, in 1890, 2242; in 1900, 2167. Consult *History of Bedford, Somerset and Fulton Counties* (Chicago, 1884).

BEDFORD CIT'Y. A town and the county seat of Bedford County, Va.; 25 miles southwest of Lynchburg, on the Norfolk and Western Railroad (Map: Virginia, E 4). It has a picturesque location, at an elevation of nearly 1000 feet, and is the seat of several educational institutions, prominent among which are Randolph-Macon Academy (Methodist Episcopal, South) and Belmont Female Institute (Presbyterian). The town lies in a productive region, and has an important tobacco trade, with a number of tobacco factories, woolen and flouring mills, foundry, etc. Population, in 1890, 2897; in 1900, 2416.

BEDFORD, GUNNING S. (1806-70). An American physician. He was born in Baltimore and graduated at Mount Saint Mary's College, in 1825. He then studied at Rutgers Medical College and in Europe. He returned in 1833, and in 1836 settled in New York, where his practice in obstetrics rapidly became extensive. With Dr. Valentine Mott he founded, in 1840, the New York University Medical College, where he occupied the chair of obstetrics until 1862. His *Diseases of Women and Children* and his *Principles and Practice of Obstetrics* were republished in England, and translated into French and German.

BEDFORD, JOHN PLANTAGENET, Duke of (1390-1435). Regent of France, and third son of Henry IV. of England. During his father's lifetime, he was Governor of Berwick-upon-Tweed, and Warden of the Scottish marches. In 1414, the second year of the reign of his brother, Henry V., he was created Duke of Bedford. He was commander-in-chief of the forces in England while Henry was carrying on the war in France. After the death of Henry V. (1422), Bedford, in accordance with the dying wish of the King, left the affairs of England in the hands of his brother, Gloucester, and went to France to look after the interests of the infant prince, Henry VI., his nephew. In compliance with the request of his deceased brother, he offered the regency of France to the Duke of Burgundy, who refused it; he then assumed it himself, but not without consulting the Duke of Burgundy as to the best method of carrying out the Treaty of Troyes, by which Charles VI. had declared Henry V. next heir to the French crown. On the death of Charles VI., a few months after Henry V., Bedford had his nephew proclaimed King of France and England as Henry VI. In the wars with Charles VII. which followed, Bedford displayed great generalship, and defeated the French in several battles—most disastrously at Verneuil, in 1424. But, in consequence of the parsimonious way in which men and money were doled out to him from England, and the withdrawal of the forces of the Duke of Burgundy, he was unable to take full advantage of his victories. The appearance of Joan of Arc was followed by disaster to the English arms, notwithstanding the utmost energy of Bedford; and in 1435 he was mortified by the treaty of peace negotiated at Rouen between Charles VII. and the Duke of Burgundy, which effectually ruined English interests in France. The death of the Regent, which took place September 19, 1435, may have been occasioned by his anxiety and vexation on account of the union thus formed. Bedford, who was a patron of letters, purchased and removed to London the Royal Library of Paris, consisting of 900 volumes. In 1469 George Neville was made Duke of Bedford; later the Count of Pembroke, Jasper Tudor, who died in 1495, had this title. For the present family of Bedford, see RUSSELL, HOUSE OF.

BEDFORD LEV'EL. A tract of low land on the east coast of England, extending from the North Sea to Milton, in Cambridgeshire, Toynton in Lincolnshire, Peterborough in Northamptonshire, and Brandon in Suffolk. It embraces the Isle of Ely and nearly the whole of the Fen District; it is 60 miles long by about 40 miles broad, comprises nearly 450,000 acres, and is intersected by artificial channels and the rivers Nene, Cam, Ouse, Welland, Glen, Lark, and Stoke, receiving the waters of nine counties. It is named after Francis, Earl of Bedford, who, in 1634, undertook to reclaim it—an operation partially effected by Sir Cornelius Vermuyden. In 1862 a strong sea burst the embankments and submerged 10,000 acres of land. Extensive drainage operations have since reclaimed and greatly improved the district, which is rich in grain and meadow land. It was the site of a great forest, which, as a British stronghold and refuge, the Romans cut down. They built an immense embankment to exclude the sea, and made the district a fertile inhabited region, traversed by roads, one of which still exists. After their departure, through the choking of the sluices, the level became a great morass, augmented by tidal inundations of the Thirteenth Century. Wisbech (q.v.) is the most important port in the district.

BEDFORDSHIRE. A midland county of England, bounded northeast by Huntingdon; east by Cambridge; southeast and south by Hertford; southwest and west by Buckingham; and northwest by Northampton (Map: England, F 4). Its extreme length is 31 miles; breadth, 25. Area, 466 square miles, five-sixths being arable, meadow, and pasture lands. The principal towns are Bedford, the capital, Biggleswade, Leighton, Buzzard, Dunstable, and Luton. The population, chiefly engaged in stock raising and agricultural pursuits, numbered in 1891, 160,700; in 1901, 171,250.

BEDFORD SQUARE. A large square in London near the British Museum.

BEDIVERE, bĕd′ĭ-vēr, Sir. A knight of the Round Table, who cast King Arthur's sword, Excalibur, into the lake, and who bore the dying King to the boat in which he was carried to the Vale of Avalon.

BED′LAM (ME. *Bedlem*, corrupted, in popular speech, from *Bethlem*, *Bethlehem*, shorter for 'Hospital of Saint Mary of Bethlehem'). The name of a hospital for lunatics, in Saint George's Fields, Southwark, London. It was originally founded in Bishopsgate Street Without, in 1246, by Simon Fitz-Mary, one of the sheriffs of London, as "a priory of canons with brethren and sisters." When the religious houses were suppressed by Henry VIII., this one fell into the possession of the corporation of London, which converted it into an asylum for 50 or 60 insane persons. In the year 1675 the hospital was taken down, and a new one, affording accommodation for about 150 patients, was erected in Moorfields, at a cost of about £17,000. In 1814 the hospital was again pulled down, and the patients were transferred to a new hospital in Saint George's Fields, erected for 198 patients, but in 1838 extended so as to accommodate 166 more. The building, with its grounds, now covers an area of 14 acres, and is lacking in nothing likely to insure the comfort or promote the recovery of patients. In former times the patients were exhibited to the public, like wild beasts in cages, at so much per head, and visitors made sport of them, as told by Pepys and Boswell, and shown in Hogarth's pictures. The funds of the hospital not being sufficient to meet the expenditure, partially convalescent patients, with badges affixed to their arms, and known as Tom-o'-Bedlams, or 'Bedlam beggars,' were turned out to wander and beg in the streets. Edgar, in Shakespeare's *Lear*, assumes the character of one of these. This practice, however, appears to have been stopped before 1675, for an advertisement in the *London Gazette* of that date, from the governors of Bedlam, cautions the public against giving alms to vagrants representing themselves as from the hospital, no permission to beg being at that time given to patients. At present the moral and physical management of the patients is so excellent that annually more than one-half of their number are returned as cured.

BED′LINGTON. A coal-mining town of Northumberlandshire, England, on the Blyth, 11 miles north of Newcastle (Map: England, E 1). Population, in 1891, 17,000; in 1901, 18,750.

BEDLINGTON. A gray, rough-coated breed of terriers. See Terrier.

BED′LOE'S, or **LIB′ERTY, IS′LAND.** An island comprising 13½ acres in upper New York Bay, 1½ miles southwest of the Battery, the southern extremity of Manhattan Island (Map: Greater New York, C 9). It was ceded to the United States Government for the purpose of harbor defense, and was once occupied by Fort Wood, on the site of which now stands the Statue of Liberty presented by France to the United States. See Liberty, Statue of.

BEDMAR′, Alfonso de la Cueva, Marquis de (1572-1655). A Spanish politician. He was accredited ambassador to Venice by Philip III., and was accused of being the originator of an infamous plot against the Venetian Republic. With the Viceroy of Naples and Don Pedro de Toledo, Governor of Milan, he planned to seize the Venetian fleet, occupy the strong posts, fire the arsenals, and with the help of an Italian army and a Spanish fleet, plunder and destroy the city. The conspiracy was discovered, and Bedmar, happy to get off with his life, was sent home (1619). He was made president of the Council of Flanders in 1622, and soon after cardinal. He finally came back to Spain as Bishop of Oviedo, and died in that city. The authenticity of the accounts of Bedmar's plot has been disputed by later historians, and, to say the least, serious doubts have been cast on it. The story of the conspiracy was treated by Otway in his *Venice Preserved*. Consult: Saint René, *Conspiration contre Venise* (Paris, 1853); Ranke, *Ueber die Verschwörung gegen Venedig* (Berlin, 1837).

BEDNAK-DOLA. See Akmolinsk.

BEDNUR, bĕd-nōōr′, or **BEDNORE,** bĕd-nōr′ (Hind., Bamboo City), or Nagar. A decayed city of Mysore, India, situated in the midst of a basin in a rugged table-land of the western Ghats, at an elevation of more than 4000 feet above the sea, in latitude 13° 15′ N. and longitude 75° 6′ E., 150 miles northwest of Seringapatam (Map: India, C 6). It was formerly the seat of a rajah, and its population exceeded 100,000. It was eight miles in circumference, and was strongly fortified. In 1763 it was taken by Hyder Ali, who pillaged it of property estimated at £12,000,000, and subsequently made it the seat of his government, calling it Hydernager (Hyder's town), of which the name Nagar is an abridgment. It was taken by the British under General Matthews in 1783, but soon retaken by Tippoo, at the head of a superior force, when General Matthews and all the principal British officers were put to death.

BED OF JUS′TICE (Fr. *lit de justice*). Literally, the seat or throne occupied by the French monarch when he was present at the deliberations of the Parlement. Historically, a bed of justice signified a solemn session, in which the King was present, to overrule the decisions of the Parlement, and to enforce the acceptance of edicts or ordinances which it had previously rejected. The theory of the old French Constitution was that the authority of the Parlement was derived solely from the Crown; consequently, when the King, the source of authority, was present, that which was delegated ceased. Acknowledging such a principle, the Parlement was logically incapable of resisting any demand that the King in a bed of justice might make, and decrees promulgated during a sitting of this kind were held to be of more authority than ordinary decisions of the Parlement. Monarchs were not slow to take advantage of this power to overawe any Parlement that exhibited signs of independence. The last bed of justice was held by Louis XVI. at Versailles, August 6, 1787.

BEDOS DE CELLES, be-dôs′ de sēl, Dom FRANÇOIS (1706-79). A French organ-builder and author, born at Caux, near Béziers. He was a Benedictine of the congregation of Saint Maur, and a correspondent of the Paris Academy of Sciences. One of the most skillful organ-builders of his time, he wrote an excellent treatise on *L'art du facteur d'orgues* (4 vols., folio, 1766-78, with numerous engravings). He published also *Gnomonique pratique* (1774), in exposition of the principles involved in the drawing of solar dials. The former work has by some wrongly been attributed to one Jean François Monniot (died 1797), a Benedictine of Saint Germain des Prés.

BEDOTT′, WIDOW. The pen name of the author of the *Widow Bedott Papers*, Mrs. Frances Miriam Whitcher.

BEDOUIN, bĕd′o͞o-ēn *or* -ĭn (Ar. *Bedwi*, *Badawī*, pl. *Badwīn*, those of the desert). A typical nomadic people, still found in their purity in the deserts of Central Arabia, where, in language, social life, and religion (outside of their profession of Islam), they retain much of primitive Semitism. They have also wandered over northern and northeastern Africa, northward to the Caucasus, and eastward beyond the borders of Persia, the rural and semi-urban conditions of parts of all these countries modifying not a little their desert-born peculiarities. Through the Berbers and Moors, with whom they have mixed, the Bedouin have had an influence upon Spain and southern France, which, in the case of the latter country, is made much of sociologically by Desmoulins in his *Les Français d'aujourd'hui* (Paris, 1898). In these migrations, much intermixture with other peoples has occurred. Their independence, spirit of liberty, sense of hospitality, restlessness, etc., all find expression in a rich fund of song and story where the dreamy and exaggerative imagination of the race has full play. Among the desert Arabs the Mufâchara, or tribal song-duel, a sort of primitive arbitration court, was developed. The contrast and interrelations of desert and oasis, and the vicissitudes of migratory life, are reflected in the social and domestic institutions of the Bedouin. The worst side of their character, the love for pillage and destruction, evidenced from the earliest times, has gained them an unenviable reputation the world over as robbers *par excellence*. (See SEMITES.) Since Burckhardt, *Notes on Bedouins and Wahabys* (London, 1830), may be mentioned Blunt, *Bedouin Tribes of the Euphrates* (London, 1879), and the general works on Arabia.

BEDREDDIN HASSAN, bĕd′rĕd-dēn′ hăs′săn. The hero of a humorous tale in the *Arabian Nights*. He is the handsome son of Noureddin Ali and the husband of the Queen of Beauty. Spirited away from his family by a genius, he becomes a pastry cook, but is reunited with his wife and son, through the agency of a cream-tart.

BED′SORE′. A sore on the hip, back, heel, etc., often a very troublesome complication of disease, to which a patient is liable when for a long time confined to bed, and is either unable or is not allowed to change his position. Bedsores are due to lowered nerve energy and pressure. Thus they are liable to occur in cases of continued fever, or any other prolonged debilitating disorder, in paralysis, and in cases of fracture. The skin, at certain projecting bony parts, chiefly about the region of the buttocks, or on the heel, is apt to inflame, ulcerate, and slough, from the continued pressure, especially if the patient is not kept perfectly clean—as, for example, when the evacuations and urine escape involuntarily. In a few of the cases the patient complains of a sense of discomfort at the parts. In all cases of prolonged supine position, the parts naturally pressed upon by the weight of the body should be carefully examined every day. When a long confinement in bed is expected, attempts should be made to thicken the cuticle, and enable it to bear pressure better, by gently sponging the skin with a stimulant such as alcohol, and the patient should be put on an air-bed or a water-bed (q.v.). If the part, when first seen, looks red and rough, further damage is often prevented by covering it with a piece of zinc-oxide plaster and at once removing local pressure by air-cushions specially constructed for cases of this kind. If the case is one in which it is admissible, the patient should be made to alter his position frequently. Excoriations should be treated like any ulcers, with balsam of Peru, or iodoform and bismuth, or strapping with adhesive plaster.

BED′STRAW′ (*Galium*). A genus of plants belonging to the natural order Rubiaceæ, and distinguished by a small wheel-shaped calyx and a dry two-lobed fruit, each lobe containing a single seed. The leaves are whorled, and the flowers minute; but in many of the species the panicles are so large and many-flowered that they ornament the banks and other situations in which they grow. The species are very numerous, natives chiefly of the colder parts of the northern hemisphere, or of mountainous regions within or near the tropics. About 200 species are known, some of them very common weeds. Among these is the yellow bedstraw (*Galium verum*)—sometimes called Cheese Rennet, because it has the property of curdling milk, and is used for that purpose—a small plant with linear deflexed leaves and dense panicles of bright yellow flowers, very abundant on dry banks. The flowering tops, boiled in alum, afford a dye of a bright yellow color, much used in Iceland; and the Highlanders of Scotland have long been accustomed to employ the roots, and especially the bark of them, for dyeing yarn red. They are said to yield a red color fully equal to that of madder, and the cultivation of the plant has been attempted in England. The roots of other species of the same genus possess similar properties, as those of *Galium trifidum*, a species abundant in low, marshy grounds in

Canada; and those of *Galium boreale*, another North American species, used by some of the Indian tribes. Like madder, they possess the property of imparting a red color to the bones and milk of animals which feed upon them. Medicinal virtues have been ascribed to some of the species, as *Galium rigidum* and *Galium mollugo*, which have been extolled as useful in epilepsy. The roasted seeds of some, as *Galium aparine*, the troublesome goosegrass, or cleavers of England — remarkable for the hooked prickles of its stem, leaves, and fruit—have been recommended as a substitute for coffee; but it does not appear that they contain any principle analogous to caffeine. This plant is a native of the northern parts of Europe, Asia, and America. Its expressed juice is in some countries a popular remedy for cutaneous disorders. The roots of *Galium tuberosum* are farinaceous, and it is cultivated in China for food. The name bedstraw is supposed to be derived from the ancient employment of some of the species, the herbage of which is soft and fine, for strewing beds.

BEE (commonly explained as 'the trembler,' from the root *bhi*, to fear; AS. *beó*, Ger. *Biene*). Any hymenopterous insect of the group Apoidea. This group (the Linnæan 'genus Apis,' and until recently regarded as the single family Apidæ, or at most two families, Apidæ and Andrenidæ) comprises those Hymenoptera which have the hind feet dilated or thickened, the hairs of the head and thorax feathery, and the tongue adapted to lapping the nectar of flowers.

Bees stand, in organization and intelligence, and in social and constructive abilities, at the head of the whole insect tribe; they abound in all parts of the world, but are most numerous in the warmer latitudes; about 5000 species are known to science; they exert a most important influence upon the vegetable world by their services in the cross-fertilization of plants, some of which now depend wholly upon their coöperation for their existence; and they furnish mankind with the important food honey, some species being semi-domesticated for the purpose of making it in large and manageable quantities for man's benefit.

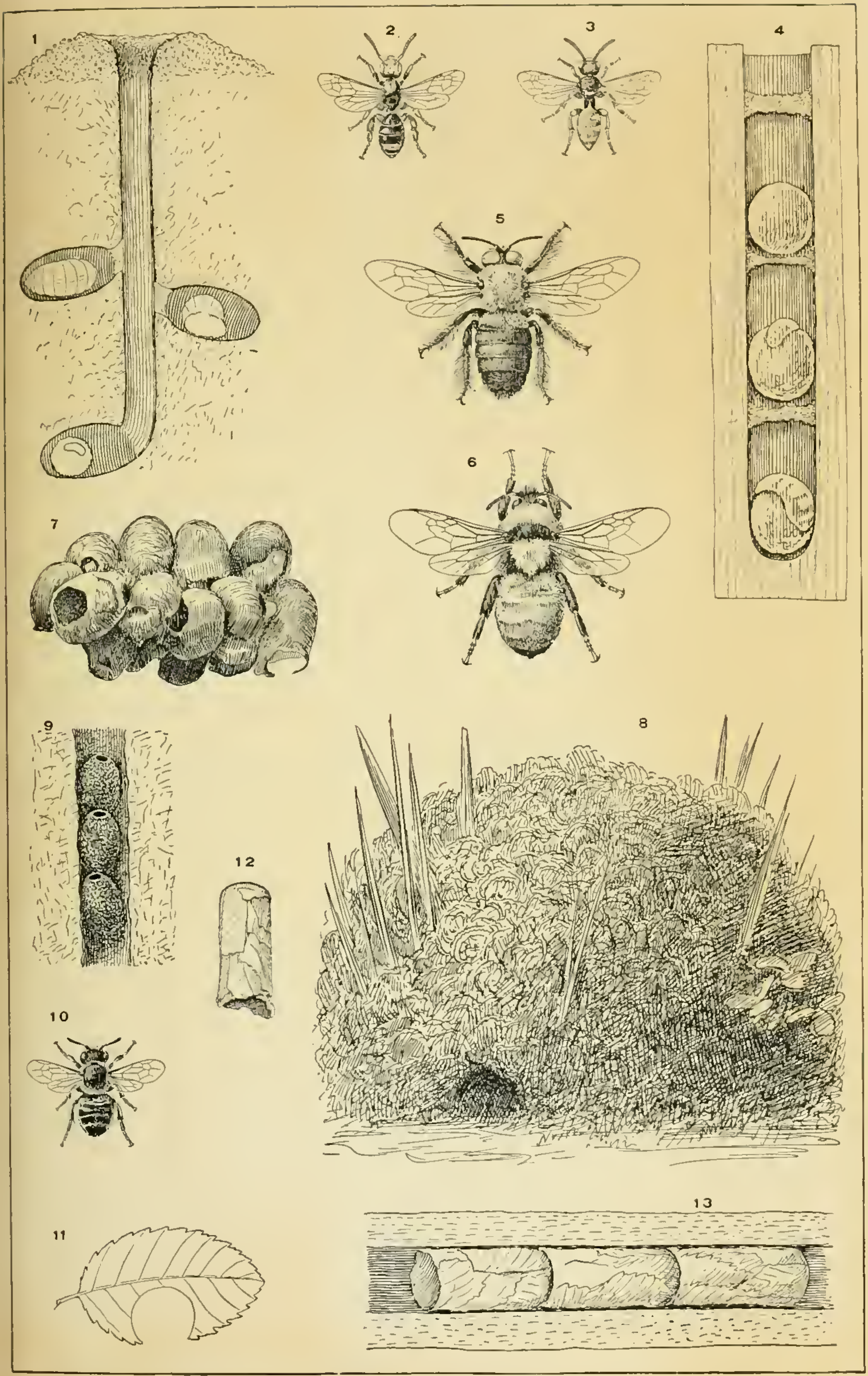
Habits. All bees feed, when adult, on saccharine juices, particularly the nectar of flowers; but the larvæ are fed by their elders on 'bee-bread,' which consists of the pollen of flowers collected by the bees and made into small masses. They begin their search with the opening of flowers in the spring, and do not cease it until the withering of the last blossoms in the fall compel the insects to desist and to go into winter quarters, where the social species have stored a supply of honey in a series of small waxen chambers or 'cells,' combined into 'combs,' upon which they subsist until spring, while the solitary species, which do not lay up such stores, mostly die; but their larvæ, snugly placed in burrows, or other concealed or parasitic situations, remain quiescent until the return of warm weather, when they emerge. These remarks apply to the colder climates; in the tropics winter is not to be feared, but extensive droughts must be provided against. It is the habit of bees to devote their searching to a single sort of flower as long as it serves their purpose, each individual visiting blossom after blossom of that kind, instead of searching flowers indiscriminately; and to this habit is due the great service they accomplish in cross-fertilization. See Pollination.

Feeding.—To enable them (or such, hereafter described, as do this work) to reach their liquid food in the nectaries, usually at the bottom of tube-like flowers, the bees have developed to the highest degree the prolonged mouth-parts or 'proboscis' characteristic of hymenopterans, and the extensile ligula or 'tongue' is hairy, and terminates in a little spoon-like part, by which the nectar is brushed or lapped out of its receptacles and conveyed into the mouth. Here it is partly swallowed into a dilatation of the œsophagus, analogous to a bird's crop, and called the 'crop' or 'honey-bag,' where it is 'ripened' into honey (q.v.). When enough has been obtained, it is disgorged either as food for those of the community which remain at home in the nest, or to be stored in the comb-cells of those species which lay up winter stores. The mouth of bees is also employed for cutting and tearing, and to this purpose their upper jaws are especially adapted. The bumblebees thus open their way into the tubes of flowers which are so deep and narrow that they cannot otherwise reach the nectar at the bottom. Others make use of their mandibles to cut out portions of leaves, or of the petals of flowers, to form or line their nests; the hive bee uses them in working with wax, in feeding larvæ with pollen, in cleaning out cells, in tearing to pieces old combs, in combats, and in all the great variety of purposes for which organs of prehension are required.

But it is not by means of any of the organs connected with the mouth that bees collect and carry to their nests the supplies of pollen needful for their young. The feathered hairs with which their bodies are partly clothed, and particularly those with which their legs are furnished, serve for the purpose of collecting the pollen, which adheres to them, and it is brushed into a hollow on the outer surface of the first joint of the tarsus of each of the hinder pair of legs, this joint being therefore very large, compressed, and of a square or triangular form—a conformation to which nothing similar is found in any other family of insects. This hollow receptacle is known as the corbiculum or 'pollen basket'; and in the social bees it is possessed only by the workers, since the perfect males (drones) and females (queens) never collect pollen.

Faculties.—Bees possess a very high development of the nervous system, brain, and senses. The great compound eyes, as well as the ocelli, characteristic of the higher hymenopterans, are here as highly developed as anywhere—perhaps higher—and bees depend greatly upon their eyes for information, observing carefully the situation of their home or any other place to which they may wish to return when leaving it for the first time, then rising in higher and larger circles until they catch sight of some landmark, when they strike straight toward it through the air; hence the proverbial phrase, 'a bee-line.' Their visual sense of form and color must be well advanced also, and the bearing of this upon the development of color and form in blossoms is a matter of very curious interest and of much importance in the history of the mutual development of these insects and the plants they fre-

WILD BEES



1. UNDERGROUND BURROWS OF ANDRANA
2. A BURROWING BEE (Halictis flavipes)
3. A PARASITIC BEE (Nomada solidaginis)
4. TUNNEL OF No. 5, BORED IN WOOD, AND SHOWING EGGS AND LARVÆ IN CHAMBERS
5. A CARPENTER-BEE (Xylocopa Carolina)
6. A BUMBLEBEE (Bombus fervidus)
7. EGG-CELLS OF BUMBLEBEE
8. NEST OF BUMBLEBEE
9. EGG-CELLS OF A MASON-BEE (Osmia)
10. A LEAF-CUTTER BEE (Megachile argentata)
11. ROSE-LEAF CUT BY No. 10
12. EGG-CELLS OF No. 10
13. SAME, LAID IN A HOLLOW PLANT-STEM

quent. They are able, also, to guide their movements in the dark as accurately as in the full light of day—at least within the nest or hive; and this power is generally ascribed to the antennæ, or 'feelers,' which are supposed to be not merely delicate organs of touch, but also organs of hearing or of smell. It is certain that the social bees communicate with each other by means of their antennæ, and that they avail themselves of these organs for their ordinary operations, for recognition of each other, and for what may be called the conduct of the affairs of the hive. There can be no doubt that bees possess in a high degree the sense of smell; and their possession of the senses of taste and hearing is almost equally unquestionable, whatever difficulty there may be in determining the particular organs of the latter sense. The degree of development of these senses differs not only among the various families, but in the several forms of each species; thus a male honey bee has 13,000 facets in each eye, while the workers have only 6000; and Cheshire calculates that one antenna of a male has 37,000 olfactory cavities, while a worker's antenna has only about 2500.

Classification. The latest conclusions of hymenopterists, following the lead of W. H. Ashmead, of the United States National Museum, are expressed in placing the bees as a super-family Apoidea of the heterophagous Hymenoptera, and in dividing them into fourteen groups ranking as families. The first two of these are 'social' in their habits, forming communities in which each individual performs some duty for the commonweal, namely, the true bees (Apidæ) and the bumblebees (Bombidæ). The remaining families are bees of 'solitary' habits, each one living and working alone, even when the species is somewhat gregarious. These solitary forms are: The hairy digger-bees of the family Anthophoridæ, the cuckoo-bees (Nomadidæ), the small carpenter-bees (Ceratinidæ), the large carpenter-bees (Xylocopidæ), the mason, leaf-cutter, and potter-bees (Megachilidæ), the parasitic Stelidæ, the burrowing Andrenidæ, Colletidæ, Prosopidæ, and others. Of these the last named is simplest and lowest.

Evolutionists consider the little prosopids, which are world-wide in their distribution, as the actual representatives of the primitive bee type, whence all have issued that are known to us to-day. "She [Prosopis] is almost naked, whereas her sisters are clad in a warm and sumptuous fleece. She has not, like the Apidæ, baskets to gather the pollen, nor, in their default, the tuft of the Andrenidæ, nor the ventral brush of the Gastrilegidæ. . . . She has no implements other than her tongue, her mouth, and her claws; but her tongue is too short, her legs are feeble, and her mandibles without strength. Unable to produce wax, bore holes through wood, or dig in the earth, she contrives clumsy galleries in the tender pith of dry berries [bramble-stems], stores these with a little food for the offspring she will never see; and then . . . she goes off and dies in a corner, as solitarily as she had lived. We shall pass over many intermediary species, wherein we may see the gradual lengthening of the tongue, enabling more nectar to be extracted from the cups of corollas, and the dawning formation and subsequent development of the apparatus for collecting pollen—hairs, tufts, brushes on the tibia, on the tarsus and abdomen—as also claws and mandibles becoming stronger, useful secretions being formed, and the genius that presides over the construction of dwellings seeking and finding extraordinary improvement in every direction." (Maeterlinck.)

Solitary Bees.—Most of the Colletidæ burrow, making rather rude tunnels, or utilizing cracks in stone walls. The Andrenidæ do the same. This is a very large and widespread family, numerously represented in the United States and in Europe. All are small, comparatively smooth, wasp-like, and often metallic in color. A notable genus is Halictus, which are among the smallest and most numerous of bees. "This genus, together with Sphecodes, differs from all other solitary bees in the fact that the impregnated females hibernate, . . . the males dying. The ensuing spring the surviving females dig their burrow, make and provision their cells and oviposit." The great genus Andrena is also commonly represented in the United States as well as other parts of the world, and, like Halictus, digs burrows 6 to 10 inches deep, from which chambers branch off, the walls of which are "glazed with a mucous-like secretion." These are among the earliest of insects to appear in the spring, flying about the 'pussy willows.' They burrow and lay eggs in May, provision their nests with pollen about June 1, and the young appear in August in the Northern States. The Stelidæ, of the Old World, are entirely parasitic in the nests of other bees, where they mature earlier than do the rightful owners, and kill such of their larvæ as they encounter, after consuming the food provided for the latter. The cuckoo-bees (q.v.) of the family Nomadidæ also lay their eggs and dwell in the nests of other bees, but seem to do so on perfectly good terms with their hosts.

The smooth and pretty 'carpenter-bees' of the family Ceratinidæ are small, active, generally metallic blue, blue-black, or bright green, and fond of sunshine. "They bore tunnels into the stems of pithy plants, and form their cells in these burrows. They are very commonly found in brambles. The cells are lined with a delicate silky membrane, and are separated from one another by mud partitions. The common *Ceratina dupla* is a familiar example. With this bee the cells are filled with a paste of honey and pollen, upon which the larvæ feed." The great carpenter-bees proper, the Xylocopidæ, are, on the other hand, among the largest and most hairy of the tribe, and make large burrows in solid wood. (See Carpenter-Bee.) The family Megachilidæ is composed of a variety of highly developed bees, some of which burrow, while others make nests in wooden tunnels lined with pieces of leaves, or form cells of clay. (See Leaf-Cutters; Mason-Bees; and Potter-Bees.) The Anthophoridæ are also hairy bees of rather large size and gaudy colors that burrow in the ground. This completes the sketch of the solitary families, which agree in having only two forms—sexually perfect males and females—and in the absence of wax-making power, while their pollen-gathering implements are very poor in the lower ranks, and in the higher by no means equal to those of the two social families next to be considered.

The social bees (bumblebees and honey-bees) are readily distinguished from other and plainly inferior members of the tribe by several striking peculiarities, succinctly stated by L. O. Howard as follows: "Each species is composed of three classes of individuals—males, females, and 'neuters' or workers. They live gregariously in larger or smaller communities. They have the power of secreting wax, from which their cells are made, and the larvæ are fed from time to time by the workers. The outer side of the dilated posterior tibiæ is smooth, and in the workers is hollowed into a shining plate for carrying pollen, which is collected by means of the pollen-brushes on the basal joint of the hind tarsi. The maxillary palpi are very small. As a general thing the body is covered with hair."

The lowest place in this category is occupied by the bumblebees (Bombidæ), or 'humblebees,' as they are more frequently termed in Great Britain. These are fully described elsewhere (See BUMBLEBEE); and here it need only be said that their colonies, inhabiting nests underground, are not permanent. All the members perish on the approach of winter except the impregnated females ('queens'). These hide away singly, and each one founds a new colony early in the succeeding spring. Consequently, the colonies are small, rarely exceeding 200 individuals, in American species, at least; and no greater stores of honey are accumulated than suffice for the season's needs.

Social Bees.—A distinct step in development, from every point of view, is the family Apidæ, or honey-bees: for these form permanent colonies, lasting through the winter by means of stored food, the amount of which is proportionate to and adequate for the needs of the colony, although that may and usually does number many thousands of lives; dispose of their unwieldy surplus of population by migration; and conduct a community life of extraordinary activity and usefulness by a systematic economy and a body of instincts, modified by intelligent judgment, which cannot be matched elsewhere in the animal kingdom. This activity and productive power has long been turned to the use of man in the care of a few species which have been domesticated since prehistoric times. The different species of honey-bee in a wild state generally make their nests in hollow trees, or among the branches of trees, sometimes under ledges or in clefts of rocks; and their stores of honey are not only sought after by man, but afford food to numerous animals, some of which equally delight to prey upon their larvæ. Several species have been made, in a limited degree, to subserve man's needs in a more regular way. The common bee of Southern Asia (*Apis Indica*) is kept in limited numbers, according to Benton, in earthen jars and sections of trees, simulating its natural home, in parts of the East Indies. Its cells are smaller than those of our hive-bee, and under the rude methods employed only ten or twelve pounds of honey is obtained. Another small East Indian bee (*Apis florea*) builds a comb about the size of one's hand, in the open air, attached to a twig of a bush, and does not seem capable of domestication. *Apis dorsata* of the Far East, on the other hand, is of gigantic size, and Benton first learned its peculiarities. They build immense oval combs, often 5 or 6 feet long and 3 or 4 feet wide, which they attach to overhanging ledges of rocks or large limbs of lofty trees in the primitive forests of southeastern Asia and the neighboring islands, including the Philippines. Benton found that when these combs were placed in frame hives the bees did not desert them, and were easily handled; the quantity of wax and honey was always very large, and there seems no reason why this kind of bee should not be brought under cultivation in civilized regions. Several other species of possible importance in the future exist in other parts of the tropics, as *Apis Adansoni* of West Africa, *Apis unicolor* of Madagascar and Mauritius, and the closely related stingless bees of the South American genus Melipona. Consult Bingham, *Fauna of British India: Bees and Wasps* (London, 1897).

Fossil Bees.—The earliest forms of bees, as far as definitely known, lived in Tertiary times. A few specimens belonging to the order Hymenoptera have been found in Mesozoic strata, but it cannot be said with certainty that they include representatives of the group Apoidea. In the Tertiary period, this group was probably fairly abundant, as a large number of fossil species have been described from Tertiary strata in Europe and America. The best-known European localities are Oensigen (Switzerland), Radoboj (Croatia), and Roth and Krottensee (Germany), where 7 species of Bombus, 5 of Anthophorites, 1 of Anthophora, 2 of Apis, and 2 of Osmia have been found. In America the Tertiary lake-beds of Florissant, Colo., have yielded a number of species of Apoidea bees, but the specimens generally are not sufficiently well preserved to permit of exact determination. The family Andrenidæ is represented in fossil form by a few specimens from North Germany and from Florissant.

THE COMMON HONEY-BEE (*Apis mellifera*). This is supposed to be of Asiatic origin, and was domesticated about the eastern end of the Mediterranean at the dawn of history, the bee-keepers of Egypt, Syria, and Greece practicing many of the arts used with bees at present, such as moving them to new pastures from time to time, etc. It traveled into Europe with the Roman civilization, if not before, and came to America with the early colonists. Several races have been developed in the course of this long history of semi-domestication, and the best of them long ago reached the United States. Its communities seem ordinarily to number from 10,000 to 60,000 individuals. These communities are made up of three classes of bees. A single one is a fully developed female, capable, after a single fertilization, of almost unlimited production of eggs; she is the mother of the band, and is usually termed the 'queen.' Another consists of male bees, or 'drones,' which at certain seasons number from 600 to 2000. The third and most common class, counted by thousands in a flourishing community, are females whose generative organs are so undeveloped that they rarely produce eggs. They are therefore popularly but erroneously called 'neuters'; but are better known as 'workers,' since they perform all the labors of the hive.

The *workers* have a body about half an inch in length and about one-sixth of an inch in greatest breadth, at the upper part of the abdomen. The antennæ are twelve-jointed and terminate in a knob. The abdomen consists of six joints or rings, and under the scaly coverings of the four middle ones are situated the *wax-pockets,* or organs for the secretion of wax. The extremity of the abdomen is provided with a sting which is straight. The basal joint of the hind tarsi is dilated to form a pollen-basket, and the legs are well provided with hairs for collecting the pollen and brushing it into this receptacle.

The *males,* or *drones,* so called from the peculiar noise which they make in their flight, are much larger than the workers, and thicker in proportion. The antennæ have an additional joint. The eyes are remarkably large, and meet upon the crown.

The *perfect females,* or queen-mothers, are considerably longer than either the workers or the males; they are also distinguished by the yellow tint of the under part of the body, and differ from all the other inmates of the hive in the shortness of their wings, which, instead of reaching to the extremity of the abdomen, leave some of its rings uncovered. Neither males nor queens have wax-pockets, nor have they pollen-baskets. Their legs also are less hairy. The sting of the queen bee is curved. The mandibles both of the males and perfect females are notched or toothed beneath the tip, while those of the workers are not. There are two rival theories for explaining the origin of the different kinds of bees in a colony. Dzierzon maintains that fertilized queens can lay fertilized or unfertilized eggs at will, the former in queen-cells and worker-cells, the latter in drone-cells. Dickel contends, on the contrary, that by a variation in the food the workers can produce at will queens, drones, or workers out of indifferent eggs or larvæ.

The greater part of the life of the queen or mother bee is spent in laying eggs for the increase of the population of the hive; and this increase goes on at a rapid rate, as the queen not unfrequently lays 3000 eggs in a day. The number, however, varies greatly. In cold weather it is very small, but the invariable presence of brood in different stages, in a well-stocked hive, proves that some eggs are laid even in winter. During the later spring months the number is very great; many practical apiarians considering that as many as 3000, or even 4000, are deposited daily. The community, however, is not destined to an indefinite increase; but in certain circumstances, *swarming* takes place, and new colonies are founded.

The impregnation of the queen takes place in the air, and usually within a few days after she has emerged from the cell. It is the only occasion of her ever leaving the hive, except that of swarming. The question has therefore been asked, why there are so many males in a bee community; but no very satisfactory answer has been given to it. The males are not known to fulfill any other purpose than that of the propagation of their species; and after the swarming season is over, the greater part of them are ruthlessly massacred by the workers, as if in dread of their consuming too much of the common store. The greater part of the workers themselves are supposed to live for from one to nine months; the duration of the life of the queen bees is rarely more than three years.

An eloquent and picturesque narrative of the nuptial flight of the queen bee has been given by Maurice Maeterlinck in his book, *The Life of the Bee,* from which the following is quoted, somewhat condensed:

"Around the virgin queen, and dwelling with her in the hive, are hundreds of exuberant males, forever drunk on honey; the sole reason for their existence being one act of love. But . . . the union never takes place in the hive, nor has it been possible to bring about the impregnation of a captive queen. While she lives in their midst the lovers about her never know what she is. Each day, from noon until three, when the sun shines resplendent, this plumed horde sallies forth in search of the bride, who is indeed more royal, more difficult of conquest, than the most inaccessible princess of fairy legend; for twenty or thirty tribes will hasten from all the neighboring cities, her court thus consisting of more than 10,000 suitors, and from these 10,000 one alone will be chosen. However great her impatience, she will yet choose her day and her hour, and linger in the shadow of the portal till a marvelous morning fling wide open the nuptial spaces in the depths of the great azure vault. . . . Then she appears on the threshold. . . . She starts to fly backward; returns twice or thrice to the alighting-board; and then, having definitely fixed in her mind the exact situation and aspect of the kingdom she has never yet seen from without, she departs like an arrow to the zenith of the blue. She soars to a height, a luminous zone, that other bees attain at no period of their life. Far away, caressing their idleness in the midst of the flowers, the males have beheld the apparition. . . . Immediately crowds collect, and follow her into the sea of gladness, whose limpid boundaries ever recede. She, drunk with her rovings, obeying the magnificent law of the race that chooses her lover, and enacts that the strongest alone shall attain her in the solitude of the ether, she rises still. . . . A region must be found unhaunted by birds, that else might profane the mystery. She rises still: and already the ill-assorted troop below are dwindling and falling asunder. The feeble, infirm, the aged, unwelcome, ill-fed, who have flown from inactive or impoverished cities, these renounce the pursuit and disappear in the void. Only a small, indefatigable cluster remain, suspended in infinite opal. She summons her wings for one final effort; and now the chosen of incomprehensible forces has seized her, and bounding aloft with united impetus, the ascending spiral of their intertwined flight whirls for one second in the hostile madness of love."

No sooner has the union been accomplished than the male's abdomen opens, the organ detaches itself, dragging with it a mass of entrails, and the emptied body falls dead toward the earth. This extraordinary flight and its tragedy seem to be Nature's effort to secure cross-fertilization, and at the same time a selection of the best available mates. To the queen mother of the hive is given a power of flight that only the strongest males can equal; nor does either of them seem much inclined to copulate until their air-tubes are distended with air and until under the excitement of extreme exertion. Hence, the lofty flight is necessary, and the best one of all the males alone can overtake the fleeing queen. After impregnation, the queen returns to her hive, is cleaned and cared for by the workers, and thenceforth devotes herself to motherhood for the increase of her tribe.

Eggs and Young.—The queen bee, when about to begin to lay eggs, is the object of great attention on the part of the workers. She moves about in the hive, attended by a sort of retinue of about 10 or 15 workers, by some of which she is frequently supplied with honey. But the name of queen bee appears to have originated in a mistaken notion that something analogous to a monarchy subsists in the beehive; and imagination being permitted free scope, many things have been invested with a false coloring derived from this analogy.

The queen bee at first lays eggs which give birth to workers, and afterwards produces eggs which become drones. With unerring instinct she places each egg in the kind of cell appropriate to it, which has been prepared beforehand by the workers, the drones' cells being larger than the workers' cells. The cells in which future queens are to be reared are very unlike all the others, but the eggs differ in no respect from those deposited in workers' cells. It is a curious circumstance that queens, of which the fecundation has been prevented till they are considerably older than usual, lay mainly drone eggs. It occasionally also happens that some of the worker bees lay eggs, and these invariably produce drones.

The eggs of bees are of an oblong shape and bluish-white color, about one-twelfth of an inch in length. They are hatched in about three days. The larvæ are little, worm-like creatures, having no feet, and lying coiled up like a ring. They are diligently fed by the working bees, until, in about five days, when large enough nearly to fill the cell, they refuse food, upon which the attendant bees seal up the cell with wax, and the larva, spinning itself a fine silken envelope or cocoon, is transformed into a pupa; and about the twenty-first day from the deposition of the egg the young bee, in its perfect state, breaks the covering, and issues from the cell. It is caressed and supplied with food by the attendant bees, and is believed not to try its wings until several days old. The cell from which a young bee has issued is speedily cleaned out and prepared for the reception of another egg or of honey. The fine silken envelope of the pupa, however, remains attached to the cell, of which the capacity thus becomes gradually smaller, until the cells of old combs are too small to receive eggs and can be used for honey alone—a fact of which the importance in relation to the economical management of bees is obvious. The spinneret, by means of which the larva spins the cocoon, is a small organ connected with the mouth. The food with which the larvæ are supplied is a mixture of pollen, honey, and water, with the addition, possibly, of some secretion from the bread-glands of the working bees, by which it is prepared. It varies a little, according to the age and kind of the larva, and the peculiarities of that given to young queens appear to be indispensable to their fitness for their future functions. Pollen is constantly found stored up in the cells of the hive, and is called 'bee-bread.' Most people have met with such cells in honeycomb, and have observed the strikingly peculiar taste of the contents.

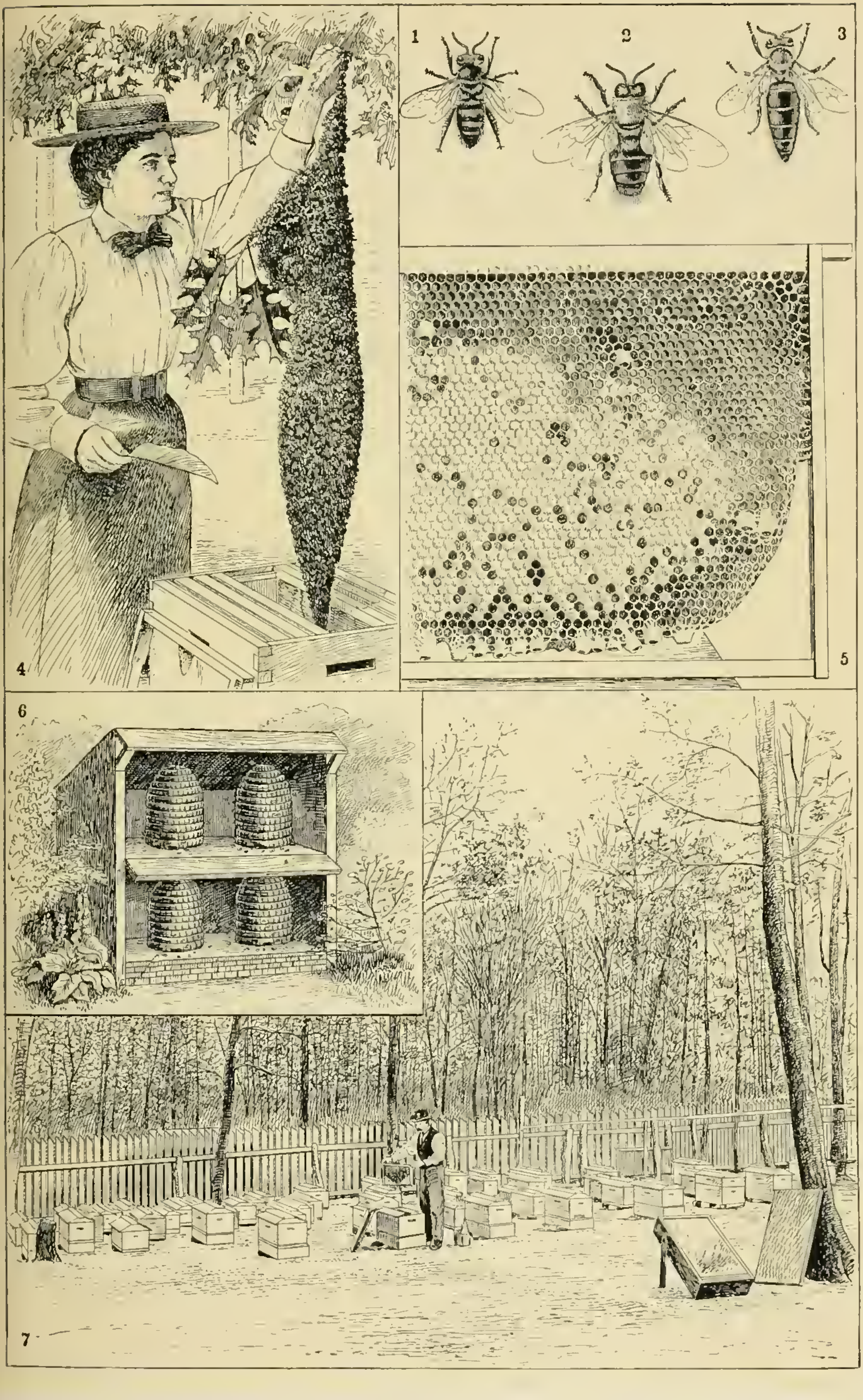
The combs of a beehive are parallel to each other, forming vertical strata of about an inch in thickness, and distant about half an inch from each other. The cells are therefore nearly horizontal, having a slight and somewhat variable dip toward the centre of each comb. The central comb is generally first begun, and next after it those next to it on each side. Circumstances frequently cause some departure from this uniform and symmetrical plan, which, however, still remains obvious. Each comb consists of two sets of cells, one on each side; and it may be mentioned as an illustration of the wonderful industry of bees, and the results of their combined labors, that a piece of comb 14 inches long by 7 inches wide, and containing about 4000 cells, has been frequently constructed in 24 hours. The greater part of the comb consists of the kind of cells fitted for breeding workers, a smaller part of it of the larger or drone cells. After the principal breeding season is over, the cells of some parts of the comb are often elongated for the reception of honey; and sometimes comb of greater thickness, or with unusually long cells, is constructed for that purpose alone, in which case the mouths of the cells are inclined upward more than is usual with the ordinary brood-cells. When a cell has been completely filled with honey, its mouth is *sealed* or covered with wax.

The comb partition is composed of a multitude of little rhombs, or four-sided figures, with equal and parallel sides, and two obtuse and two acute angles, the obtuse angles being angles of 109° and the acute angles of 71°, agreeing with the results of mathematical analysis, applied to the difficult question of the form of the facets of a three-sided pyramid, which should terminate a six-sided prism, so as to combine the greatest economy of materials with the greatest strength. On looking at a piece of empty honeycomb, placed between the eye and the light, we readily perceive that the cells are not opposite to each other, cell to cell; but that the point of meeting of three sides of three cells, on one side, is opposite to the centre of a cell on the other side—a circumstance which is calculated greatly to increase the strength of the whole fabric. It follows also from this that the terminating pyramids of the cells on the one side do not interfere with the form of the cells on the other side; but the three rhombic facets, which terminate each cell, belong likewise to three distinct cells on the opposite side of the comb.

The only departure from perfect regularity in the form of the cells is in the transition from the smaller or workers' cells to the larger or drones' cells, which, when it takes place, is managed with great simplicity and beauty of contrivance.

Beeswax.—The material of which cells are built is chiefly wax (see BEESWAX), which is at first of a white color, but becomes brownish-yellow with age, and in very old combs almost black. Although wax exists as a vegetable product, yet beeswax is now known to be produced in the bodies of bees; and it has been found that they produce wax and build combs when supplied only with honey or saccharine substances. The bees which are about to proceed to wax-making suspend themselves in clusters in the hive, attaching themselves to each other by means of hooks with which their feet are provided; and while they remain motionless in

BEES, AND BEE CULTURE



1. WORKER, HONEY BEE.
2. DRONE, HONEY BEE.
3. QUEEN, HONEY BEE (Carniolan variety).
4. HIVING A SWARM.
5. COMB, showing worker, brood and queen cells.
6. OLD-FASHIONED BEE-HIVES.
7. A MODERN APIARY.

this position, the wax appears to be formed, in small scales, which they afterwards take in their mouths and curiously work up with a secretion from the mouth itself, passing the wax, in the form of a minute riband, through the mouth, first in one direction and then in the opposite one, and finally depositing it in its proper place for the foundation of the comb. The bees which elaborate and deposit the wax do not, however, always construct the cells, others aiding in this, partly by a process of excavation in the wax deposited. It is supposed, by many naturalists, that some of the working bees are exclusively wax-workers, some nurses, etc.; but others think that there is only one class of working bees, all ready for any kind of work according to circumstances.

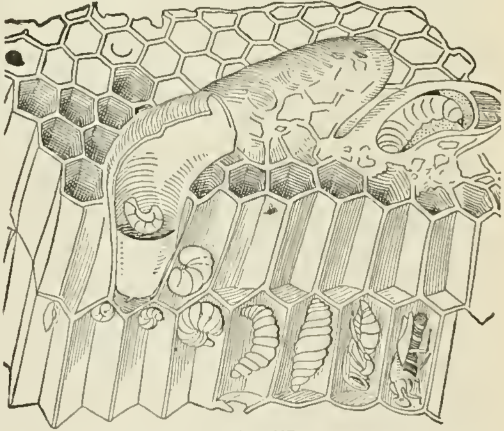
But wax, although the chief, is not the only material of the combs. *Propolis* (q.v.) is also employed in small bands to give greater strength to the cells, the mouths of which are surrounded with it, and made thicker than their walls. This substance, which is obtained by bees from the viscid buds of trees, is also employed for more firmly attaching the combs to the hive, for closing up apertures in the hive, for covering up obnoxious substances, which are too large to be removed, and for a variety of similar purposes.

The Origin and Rearing of Queens.—Queen bees are hatched and reared in cells different from the rest. They are, indeed, very different, being vertical and not horizontal in their position—not hexagonal, but rather oval in form—and much larger than the other cells, even in proportion to the size of the animal that is to inhabit them; they are generally placed on the edge of a comb, and when they have served their purpose, are partially removed, so that during winter they resemble acorn-cups in appearance.

Two queens cannot long exist in the same community. There is implanted in them a deadly rivalry; and the mother-bee, if permitted, would even tear open every queen-cell of which the inmate has nearly approached maturity, and inflict death by her sting; but workers throng around the queen, hem her in, and prevent the execution of her purpose. The cell of the young queen is also carefully guarded, and she is not permitted to leave it. At such times peculiar sounds, produced probably by the action of the wings, are emitted both by the actual queen under restraint in her movements, and by the young one in the cell, which may be heard by an ear applied to the outside of the hive, and are familiar to bee-keepers as one of the surest signs of swarming.

Swarming.—The queen now becomes restless; her agitation communicates itself to those around her, and extends through the hive; the ordinary work of the community is in great part neglected; fewer bees than usual are seen to leave or return to the hive; and at last the queen bee rushes forth, preceded and followed by crowds which press and throng upon each other, form a buzzing cloud in the air, and very generally settle upon a bush in the neighborhood, where they soon congregate closely together, hanging by their claws in a dense cluster. Sometimes they rise up in the air, and fly off at once to a considerable distance, apparently to some previously selected place in the hollow of a tree—in the chimney or roof of a house, where they happen to find an aperture—or in some such situation. More frequently, they settle not far from the hive which they have left, often on some very humble plant, or even on the grass, and soon rise again. It is the care of the keeper to prevent this by providing them immediately with a suitable habitation in a new hive, invitingly placed above them, or into which he puts the swarm after they have congregated closely together as above described. It sometimes happens that bees hurry out of their hive without their queen, in which case they do not in general congregate so closely together where they settle, and soon return to the hive again. Swarming generally takes place on a fine day; and when the bees seem on the very point of coming out, a cloud passing over the sun is enough to retard it. Bad weather occasionally not only retards but prevents it, the young queens being at last killed in their cells. A week after the first swarm of the season has left the hive with the old queen, as is usually if not always the case, the first young queen emerges; and if the bee community is a large and prosperous one, other young queens also come forth from their cells, and leave the hive with successive swarms, the number of which depends upon the climate, the season, etc. In England, it is not uncommon for a beehive to send off three swarms in a summer, the first being almost always the largest, and not unfrequently itself sending off a swarm before the season is over. If a large production of honey is desired, it is customary for bee-keepers to prevent more than one swarm coming from each hive during a single season. This swarming of the bees is, of course, made necessary by the over-population of the hive, and is Nature's method of providing for the increase and proper dissemination of the species, by the establishment of new colonies. That the swarms should, in a wild state, seek new homes at a considerable distance is necessary, because only thus could the bee communities become sufficiently scattered to enable all to find sufficient flowers to furnish food.

Bees left without a queen, and with no means of supplying the want, appear to feel themselves cut off from the very purpose of their existence; the labors of the community are slackened, and its members soon dwindle away. It has already, however, been stated that bees left with-


HONEYCOMB.
Showing two great queen-cells, and worker-cells containing an egg, larvæ and pupæ in various stages.

out a queen can provide themselves with one by transforming and enlarging a worker's cell which contains an egg or very young larva. This process is sometimes carried on as if by several distinct parties, in different parts of the hive at once; and, as if aware that time will be gained, the bees generally prefer cells containing larvæ of two or three days old to those containing eggs.

Winter Life and Enemies.—Bees become torpid during cold weather, and consume comparatively little food. They are readily aroused from this state, however, as may at any time be proved by tapping on a beehive, when it will be found that the temperature of the interior of the hive rises rapidly. Respiration is considerably lessened in the state of torpidity, and the temperature rises when it is resumed. The respiration of bees takes place by air-tubes or *tracheæ* (see INSECTS), and is very active when the insect is in a state of activity. The respiratory movements are easily seen in looking at a bee. The consumption of oxygen by this process might be expected soon to reduce the atmosphere within a hive to a state in which it could no longer support animal life; but in summer, when respiration is active and the hive populous, a constant circulation of air is maintained by the insects themselves, some of which are employed in a rapid vibration of their wings for this purpose. A greater or smaller number of them, according to circumstances, may frequently be seen thus engaged in fanning the air at the mouth of a beehive.

Among the enemies of bees, mention should be made of the bee-moth, which, notwithstanding the danger of the stings of the bees, enter the hives and deposit their eggs. They belong to the small family Galleriidæ, with only seven species in the United States. One species, *Galleria mellonella*, a well-known pest, is a purplish-brown and yellow moth, which creeps into the hive at night to deposit her eggs. The larvæ hide by day and feed at night on the wax, burrowing through the cells and doing much damage, even to the extent of destroying the colony. The bee colony should be kept strong, the cracks in the hive should be well filled to keep out the moth, and all moths and larvæ seen should be killed. Mice sometimes eat their way into the hives in winter, and destroy and plunder unmolested. The bee-louse (*Braula cæca*) is a troublesome parasite of bee colonies in the Mediterranean region, being most frequently found on the thoraces of queen bees. Several species of robber flies and dragon flies occasionally capture bees and eat them. There are also a number of bee-killing birds in Europe and the United States.

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BEE, BARNARD E. (1824-61). A Confederate general, born in South Carolina. He graduated in 1845, at West Point, and served with great ability and gallantry in the Mexican War. He was on frontier duty from 1848 to 1861, became a brigadier-general in the Confederate Army, and was mortally wounded while leading his brigade at Bull Run, July 21, 1861.

BEE, HAMILTON PRIOLEAU (1822-97). A Confederate general, brother of Barnard E. Bee, born in Charleston, S. C. He was secretary on the commission which ran the boundary line between Texas and the United States from the mouth of the Sabine River to Red River (1839), acting as a representative of Texas. President Houston, of Texas, sent him as a commissioner to treat with the Comanche Indians in March, 1843, and although he and his associates were at first made prisoners, the mission was finally successful. When the hostilities with Mexico began, he resigned his office of secretary of the Texas Senate, and joined Gen. Ben McCulloch's cavalry. He became a brigadier-general of the Provisional Army of Texas in 1861, and in the Confederate Army in 1862.

BEE, THE. A weekly magazine, first published by Mr. Wilkie, a London bookseller, on October 16, 1759. It ran through only eight numbers, but is notable from Goldsmith's contributions.

BEE-BALM, bäm. See OSWEGO TEA.

BEE-BIRD, or **BEE-MAR'TIN.** The North American kingbird. In reference to its habit of catching honey-bees, see KINGBIRD.

BEECH (OHG. *buocha*, Lat. *fagus*, Gk. φηγός, *phēgos*, oak; cf. Skt. *bhaksh*, to eat), *Fagus*. A genus of trees of the natural order Fagaceæ. The species are not numerous; most of them are forest trees of great beauty. The genus has been divided into two sections—*Eufagus*, with four species in the Northern Hemisphere, and *Nothofagus* in the Southern, with a dozen species. By some botanists these are considered distinct genera. The European Beech (*Fagus sylvatica*)—see Plate of BALSAM—forms pure forests in many parts of Europe. It grows to a height of 100 to 120 feet and a diameter of 4 feet, and when standing alone becomes a very ornamental tree, with far-spreading branches, which often droop gracefully almost to the ground. It has thin, ovate, obscurely toothed leaves, finely ciliated on their margins. Its bark is smooth, and is often of a whitish color. The beech thrives best in light but not sandy soils, and does not send its roots deep into the ground, but rather horizontally under the surface. The wood is more or less of a reddish-brown color. It is very hard and solid but brittle, and when exposed to the open air very liable to rot and to be eaten by worms. When kept under water, it is very durable; hence its use in the erection of mills and for weirs, sluices, etc. It is also employed for many purposes by cabinet-makers and turners. It is very much used in France for making the *sabots*, or wooden shoes, worn by the peasantry, being preferred for this purpose to every other wood except walnut, on account of its incapacity for absorbing water. It is one of the best kinds of firewood in Europe. The bark is sometimes employed in tanning when oak bark is scarce. The beech bears lopping well, and is often planted for hedges. Beechnuts, when fresh, have a sweet taste, like that

BEECH AND BOXWOOD

1. BEECH (Fagus); typical form.

2. BOX (Buxus sempervirens).

of a walnut. They contain in large quantity a bland fixed oil, along with starch, a little sugar, and an astringent substance. A volatile, narcotic, poisonous principle, called *fagine*, is also found in them, but more in the husk than in the kernel; and when not only the smooth, leathery, outer husk, but also the thin brown inner pellicle have been removed, they constitute a wholesome food. They are, however, more generally used for feeding swine, poultry, etc., and are much employed in France and other parts of Europe for the manufacture of *beech oil.* When expressed without the application of heat, and well clarified, this oil has an agreeable taste and is used for food; it keeps long without becoming rancid. Beech forests anciently abounded in England, and great herds of swine were fed in them. The beech is not, in general, found in Europe north of latitude 59°, although it occurs two degrees farther north in the Scandinavian Peninsula and in the temperate parts of Asia. In gardens and pleasure-grounds a variety is very frequently to be seen, the leaves of which have a blood-red color. The same color appears also in some degree in the leaves of the beech of North America (*Fagus ferruginea*), which is distinguished by ovate, coarsely serrated, and much acuminated leaves. It forms extensive forests in the northeastern United States and the adjoining British Possessions; and its wood, which is of a somewhat red or rusty color, is more valued than that of the white beech. Several species of the beech are natives of the more elevated parts of the south of New Zealand; others belong to the south of South America. The genus is, in fact, more characteristic of the colder latitudes of the Southern than of the Northern Hemisphere. *Fagus Cunninghamii* is the 'myrtle-tree' of the mountains of Tasmania—a very large tree, with evergreen leathery leaves, in form much resembling those of the birch. *Fagus betuloides* is the evergreen beech of Tierra del Fuego, where it forms forests of which the dark-green foliage contrasts strikingly in winter with the dazzling snow. The wood is too heavy and brittle for masts, but makes tolerable planks, and is carried to the treeless Falkland Islands for roofing houses. *Fagus antarctica* ascends higher on the mountains about the Strait of Magellan. It has deciduous leaves, and much resembles the common beech. *Fagus procera* grows in the Andes of Chile, and attains a majestic size. It is a valuable timber tree. In the United States, *Carpinus Caroliniana*, a small tree, is called Blue Beech and Water Beech.

BEECH DROPS. See CANCERROOT.

BEECH'ER, CATHERINE ESTHER (1800-78). An American philanthropist and writer, distinguished for her efforts to advance the education of women. She was born at Easthampton, L. I., the daughter of Lyman Beecher (q.v.), and at the age of 19 years was betrothed to Professor Fisher, of Yale, who shortly after lost his life at sea. She never married, but dedicated herself to the advancement of female education, opened a school at Hartford in 1822, and in 1832 one for young women in Cincinnati. Though she gave this up in 1834, on account of ill-health, she continued to organize societies and schools for training women to social service, and to this end published numerous books, among which may be enumerated *True Remedy for the Wrongs of Women* (1851); *Letters to the People on Health and Happiness* (1855); *Common Sense Applied to Religion* (1857); and *Religious Training of Children in the School, the Family, and the Church* (1864). She was a brilliant, rather eccentric woman, the sister of Henry Ward Beecher and of Harriet Beecher Stowe.

BEECHER, CHARLES (1815-1900). An American Congregational divine. He was born at Litchfield, Conn., the fourth son of Lyman Beecher; was fitted for college at the Boston Latin School and at Lawrence Academy, Groton, and graduated at Bowdoin in 1834. He studied theology at Lane Seminary, and officiated as pastor of the Second Presbyterian Church, Fort Wayne, Ind., from 1844 to 1851; of the First Congregational Church, Newark. N. J., from 1851 to 1854; of the Congregational Church, Georgetown, Mass., in 1857. From 1870 to 1877 he resided in Florida, and was for two years superintendent of public instruction. In 1885 he became stated supply at Wysox, Pa., and died at Haverhill, Mass., April 21, 1900. He aided Henry Ward Beecher in the compilation of *The Plymouth Collection*, and Mrs. Stowe in *Sunny Memories of Foreign Lands*, and published *The Incarnation* (1849); *Pen Pictures of the Bible* (1855); *Spiritual Manifestations* (1879); *Eden Tableaux* (1880); and edited his father's autobiography and correspondence (2 vols., 1864).

BEECHER, CHARLES EMERSON (1856-1904). An American paleontologist, born at Dunkirk, N. Y. He graduated at the University of Michigan in 1878, and obtained the degree of Ph.D. from Yale in 1889. His early work in paleontology was done under the direction of Prof. James Hall, at Albany, N. Y. In 1888 he received an appointment at Yale University, was made professor of historical geology in 1892, and after the death of Professor Marsh he became the curator of the geological collections and professor of paleontology. Beecher's most important contributions have been to the knowledge of the development and structure of the trilobites and brachiopods. Several papers on the ontogeny and phylogeny of these and other classes of animals were collected in one volume entitled *Studies in Evolution* (1901), and appeared as one of the Yale Bicentennial publications. He also published "Brachiospongidæ: A Memoir on a Group of Silurian Sponges," *Memoirs of the Peabody Museum of Yale University*, Vol. II., Part I. (1889). He became a member of the National Academy of Sciences in 1899.

BEECHER, EDWARD (1803-95). An American Congregational divine, born at East Hampton, L. I., the second son of Lyman Beecher. He graduated at Yale, 1822, and in theology at Andover; was pastor of Park Street Congregational Church, Boston, from 1826 to 1830; president of Illinois College from 1830 to 1844. He officiated as pastor of the Salem Street Church, Boston, from 1846 to 1856, and of the Congregational Church at Galesburg, Ill., from 1856 to 1872; then removed to Brooklyn, N. Y., where he engaged in literary and missionary work, and was pastor of the Parkville Congregational Church from 1885 to 1889. He was for six years senior editor of *The Congregationalist*, and was for several years on the editorial staff of *The Christian Union.* Dr. Beecher wrote much on the theme that man is in a progressive state, the present being the outcome of a former life and a preparation for a future one to succeed after death; that the struggle between good and evil will not end with this life, but in some future era all conflicts will be ended, evil will disappear, and harmony become established. These views are set forth in *The Conflict of Ages* and *The Concord of Ages* (1860). He also published *Baptism: Its Import and Mode* (New York, 1850); *The Papal Conspiracy Exposed* (New York, 1855; Edinburgh, 1856); *History of Opinions on the Scriptural Doctrine of Retribution* (New York, 1878). He died in Brooklyn, July 29, 1895.

BEECHER STOWE, Harriet E. See Stowe, Harriet E. B.

BEECHER, Henry Ward (1813-87). A Protestant pulpit orator. He was the eighth child and third son of Lyman Beecher and Roxana Foote, a granddaughter of Gen. Andrew Ward, and was born in Litchfield, Conn., June 24, 1813. He received his early education at home, and at a private school in Bethlehem, and was known as a sensitive, diffident child, his talents first showing themselves when he was about 11 years of age, in a debate with an older schoolmate over Paine's *Age of Reason*, young Beecher winning the victory. With little aptitude for study, he had a strong desire to go to sea—a plan abandoned on his conversion, during a revival of religion, and in 1826 he entered the Boston Latin School. Completing his preparatory course at the Mount Pleasant School, in Amherst, he entered Amherst College, graduating in 1834, having taken only fair rank in mathematics and the classics, but having displayed marked ability as a writer and debater. On graduation he studied theology under his father in Lane Seminary; was in 1837-39 and 1839-47 pastor of Presbyterian churches in Lawrenceburg and Indianapolis, Ind., and in 1847 was called to take charge of Plymouth Church, a new Congregational organization in Brooklyn, N. Y., which soon became noted on both continents for its bold advocacy of unpopular reforms, such as abolition and temperance, and for the generosity and intelligence of its members. His congregation became one of the largest in America, the seating capacity of the church being nearly 3000. But it was not to this audience alone that he preached; for, as he believed that all things concerning the public welfare are fit subjects for a minister, his opinions on all questions were eagerly read by the public at large. He disregarded the conventional methods of preparing sermons, did not always rely on notes, even; and the physical strength that enabled him to deliver several discourses in a day was scarcely less wonderful than the eloquence, dramatic power, pathos, and wit that characterized them. Fierce in his denunciations of injustice, he was, nevertheless, tender-hearted, charitable, and catholic. Though a steadfast believer in the divinity of Christ, his theology was not in general accord with that of the Congregational denomination. In 1878 he formally renounced his belief in the eternity of future punishment. He was, perhaps, the most popular lecturer in the country, and was an unrivaled after-dinner speaker. Among his orations are that delivered at the celebration of the centennial anniversary of the birthday of Burns (1859) and that (by request of the Government) at Fort Sumter, April, 1865, on the anniversary of its fall.

He allied himself with the Republican Party as soon as it was formed, lent his pen and his pulpit to further its aims, and during the canvass of 1856 traveled far and wide to speak at mass-meetings. In 1863 he visited Europe for his health, and when in Great Britain addressed vast audiences on the purposes and issues of the Civil War, speaking in one instance for three hours consecutively, and changing materially the state of public opinion. In 1884 he supported heartily the Democratic candidate for President. In 1874 suit was brought against him for adultery by his former intimate friend, Theodore Tilton. The trial lasted six months, resulting, after fifty-two ballots, in a disagreement of the jury, nine of the twelve voting in Mr. Beecher's favor.

Mr. Beecher was a strong advocate of free trade and of woman suffrage. His last public speech was in favor of high license, at Chickering Hall, New York, February 25, 1887. He died in Brooklyn on March 8th following, and was buried in Greenwood Cemetery. His summer home for many years previous had been at Peekskill, on the Hudson, where he indulged his taste for farming and horticulture. He was fond of art, gems, flowers, and animals. He was chaplain of the Thirteenth Regiment, National Guard, 1878-87.

In 1837 Mr. Beecher was connected with an anti-slavery paper in Cincinnati, and while in Indianapolis contributed to an agricultural publication the papers afterwards issued as *Fruit, Flowers, and Farming*. On coming to Brooklyn he began, in the *Independent*, the series known as the "Star Papers," so called from his signature (*), and published in two volumes (New York, 1855-58); was the editor of *The Independent*, 1861-63, and the editor of the *Christian Union*, 1870-81. He contributed frequently to the *New York Ledger;* one series of essays, called "Thoughts As They Occur," being republished as *Eyes and Ears* (Boston, 1864). His sermons, reported regularly after 1859, form the numerous volumes entitled *Plymouth Pulpit*. His first book, *Lectures to Young Men* (discourses delivered at Indianapolis), was published in 1850. Among other works are *Industry and Idleness; Sermons on Freedom and War; The Plymouth Collection of Hymns and Tunes; Speeches on the American Rebellion* (London, 1864); *Norwood*, a novel (1868); *Yale Lectures on Preaching*, three series, delivered at New Haven on the Lyman Beecher foundation (1872-74, 3 vols.); *The Life of Christ* (Vol. I. 1871, Vols. II. and III., 1891); *The Strike and its Lessons* (1878); *A Circuit of the Continent* (1884); *Doctrinal Beliefs and Unbeliefs, Evolution and Religion* (1885). In 1868 Lyman Abbot published two volumes of selected *Sermons*, which were revised by their author, and these will be found to represent his pulpit work at its best. The phonographically reported *Prayers from Plymouth Pulpit* (1867), should also be read, as Mr. Beecher was very felicitous in his public prayers. Among numerous compilations from his sermons are *Life Thoughts* (2 vols., 1859); *Morning and Evening Devotional Exercises*, edited by Lyman Abbot (1870); and *Comforting Thoughts* (1884). For his biography consult Samuel Scoville (New

York, 1888), and T. J. Ellinwood, his private stenographer for thirty years, to whom we owe the reports of Mr. Beecher's sermons and prayers and speeches), *Autobiographical Reminiscences of Henry Ward Beecher* (New York, 1898). Mr. Beecher married, 1837, Eunice White Bullard, born West Sutton, Mass., August 26, 1812, and author of *From Dawn to Daylight* (1859), etc., who died in Stamford, Conn., March 8, 1897.

BEECHER, Lyman (1775-1863). An American theologian. He was born in New Haven, Conn., October 12, 1775; died in Brooklyn, N. Y., January 10, 1863; descended from one of the New Haven Colony of 1638. He lost his mother when an infant, and was adopted by an uncle, Lot Benton; graduated from Yale in 1797, and next year became pastor of the Presbyterian Church at East Hampton, Long Island, where his first wife, Roxana Foote, increased their slender means by teaching a private school. Mr. Beecher's sermon on the death of Alexander Hamilton (killed in a duel with Aaron Burr in 1804) gave him immediate fame, which rapidly increased until he was recognized as one of the foremost preachers in the country. In 1810 he went to Litchfield, Conn., where he was pastor of the Congregational Church sixteen years. In 1814 he delivered and printed a series of six sermons against intemperance, which added greatly to his reputation for eloquence and power. He was also foremost in the Unitarian controversy which pervaded eastern New England. In 1826 he became pastor of the Hanover Street Congregational Church, Boston. In 1832 he became president of Lane Theological Seminary, a new institution near Cincinnati, Ohio, and held the office for twenty years, during the first ten of which he was pastor of the Second Presbyterian Church in Cincinnati. In 1835 he was tried by his Presbytery for teaching false doctrines, but was acquitted then, and again on appeal to the Synod. When the Presbyterian Church separated, he went with the New School branch (1838). In 1852 he returned to Boston, intending to revise and publish his writings, but his mental powers failed, and not very long afterwards he retired from public work, removing to Brooklyn, where he lived with his son, Henry Ward Beecher. He was married three times, and had thirteen children. All his sons, seven in number, became clergymen. Dr. Beecher's sermon's and speeches, though usually delivered extemporaneously, were the result of careful study, and were marked by boldness, convincing argument, shrewd common sense, and irresistible wit. Consult: his *Collected Works* (3 vols., Boston, 1852); *Autobiography and Correspondence*, edited by his son, Charles Beecher (New York, 1865); also James C. White, *Personal Reminiscences of Lyman Beecher* (New York, 1882).

BEECHER, Thomas Kinnicut (1824-1900). An American Congregational clergyman, born at Litchfield, Conn. He graduated at Illinois College, 1843, and from 1854 until his death was pastor of a church in Elmira, N. Y., where he died. The son of Lyman Beecher, he shared the family genius, and was noted for eccentricity and practical philanthropy. His publications embrace *Our Seven Churches* (1870), in which is a series of observations upon seven denominations in Elmira, and a posthumous work, *In Tune With the Stars*, stories for children, edited by Clara J. Farson (1901).

BEECHER, Willis Judson (1838—). An American educator and author, born in Hampden, Ohio. He graduated at Hamilton College in 1858, studied at the Auburn Theological Seminary, and in 1865 was appointed professor of moral science and belles-lettres at Knox College. He was pastor of the First Congregational Church in Galesburg, Ill., from 1869 to 1871. In 1871 he was appointed professor of the Hebrew language and literature in Auburn (N.Y.) Theological Seminary. He has contributed frequently to periodicals, and has published *Farmer Tompkins and His Bibles* (1874), *Drill Lessons in Hebrew* (1883), and *Old Testament Notes* (1897).

BEECHEY, bē′chĭ, Frederick William (1796-1856). An English rear-admiral and geographer, son of Sir William Beechey. He entered the navy in 1806, and in 1814 was appointed to the *Tonnant*, and in 1815 participated in the battle of New Orleans. In 1818 he accompanied, in the *Trent*, the Arctic expedition under Franklin, and in 1819 served on the *Hecla* during Lieutenant Parry's voyage. In 1822 he was promoted to be commander, and from 1825 to 1829 commanded the *Blossom*, which sought to coöperate by way of Bering Strait with Arctic expeditions approaching from the eastward. Having been promoted to be captain, he in 1835-36 explored a part of the South American coast, and from 1837 to 1847 was employed on the Irish coast survey. In 1855 he was elected president of the Royal Geographical Society. He was the discoverer of Ports Clarence and Grantley, and published *A Voyage of Discovery Towards the North Pole* (1843).

BEECHEY, Sir William (1753-1839). An English portrait-painter. He was born at Burford, in Oxfordshire, December 12, 1753. He is said to have been a house-painter before becoming a student at the Royal Academy. His portraits were the fashion of his time, but they were pronounced stiff and lacking in dignity, though correct in likeness. He was made portrait-painter to Queen Charlotte, and won the patronage of the Court and of the fashionable class. He was knighted by George III. for his picture, now at Hampton Court, which represents the King reviewing troops. This also brought him the rank of R.A. His earlier drawings exhibit more care and finish than are shown in his later works when his popularity was assured. As a mark of his industry, it may be noted that in 64 years he exhibited 362 portraits at the exhibitions of the Royal Academy. Among the famous people whom he painted were Lord Nelson, Lord Cornwallis, John Kemble, and Mrs. Siddons. He died at Hampstead, January 28, 1839. Two examples of his portraits are in the Metropolitan Museum of Art, New York. Consult Wilmot-Buxton and Koehler, *English and American Painters* (New York, 1883).

BEE′DER. See Bidar.

BEE′-EAT′ER. A bird of the picarian family Meropidæ, specifically *Merops apiaster*, very common in the Mediterranean region and occasionally farther north. The remaining 30 species of the family are mainly African or Oriental. They have rather long beaks, and long swallow-like wings, giving them great grace and speed in flight, and enabling them to capture insects on the wing. All wear a gorgeous plumage, green being the prevailing tint, and all the species have suffered great persecution from those who collect feathers and skins for millinery purposes. The common bee-eater is perhaps the most beautiful bird of Europe. The crown and mantle are rich chestnut, passing lower down into primrose, the head white and black and the throat yellow, while the rest of the plumage is mainly vivid greenish-blue. Like several related families, the bee-eaters breed in holes in earthen banks, sometimes 6 to 8 feet long and of their own digging, and often gather in great colonies; the shining white eggs rest upon the earth, but become half buried after a time in the wings and rejected parts of insects. The food of these birds consist almost wholly of bees and wasps. They congregate about beehives, and, swooping close to them, seize and consume honey-bees in great numbers, until the cessation of flowers in August, and consequently of bee-work, compels these birds to migrate southward. In mid-Africa the natives observe their movements as a guide to stores of wild honey. See Plate of Kingfishers, Motmots, etc.

BEEF. See Meat.

BEEF'EAT'ER, or **BUF'FALO BIRD.** See Oxpecker.

BEEFEATER (*beef* + *eater*, menial; cf. AS. *hlāfaeta*, servant, from *hlāf*, loaf + *etan*, to eat). The popular designation for the British sovereign's Yeomen of the Guard. Since the reign of Henry VII., they have formed part of the monarch's train at royal banquets and other state occasions. Their costume, maintained with unimportant alterations for nearly four centuries, has much to do with their attractiveness to sightseers. The appellation is commonly, but erroneously, supposed to be a corruption of the French *beaufetier* or *buffetier*—one who attends the buffet, or sideboard. Skeat maintains that it means simply *eater of beef*, a servant or dependent, and quotes *eaters* (from Ben Jonson) and *powder-beef-lubbers*, similarly used. Consult Preston, *Yeomen of the Guard* (London, 1887). See Yeomen of the Guard.

BEE-FLY. A fly of the family Bombyliidæ, many of which resemble bees in general appearance, their bodies being more or less covered with dense whitish or yellowish hair. Some resemble bumblebees, while others are much more slender. They are flower-flies, living upon the nectar of flowers, and are efficient agents in the cross-fertilization of plants, the pollen adhering readily to their hairs. The larvæ are parasitic in the egg-pods of grasshoppers, and also prey upon such caterpillars as cutworms.

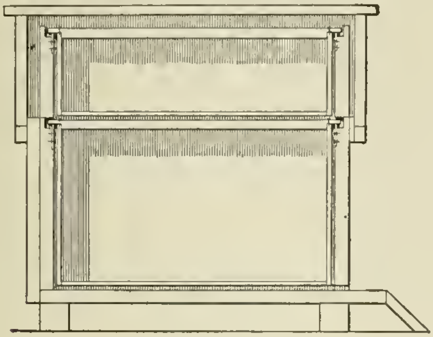
BEEF'STEAK' CLUBS. A number of well-known social clubs, formed for the most part in London in the Eighteenth Century. The earliest of these was founded in 1709, with Richard Estcourt, the actor and friend of Steele, as *providore*, and having as members many of the wits, authors, and men of affairs of the day. The most famous of the clubs, however, was the "Sublime Society of Steaks," founded in 1735 by John Rich, then manager of Covent Garden Theatre. The story is told of the formation of this club that Lord Peterborough supped accidentally with Rich on steak and beer, and found these so much to his taste that the meetings became regular. They were held in a room in the theatre, and as in all true Beefsteak clubs, the refreshments were limited to steaks with beer or wine. Hogarth, Thornhill, Wilkes, Garrick, Dodington, Aaron Hill, Leonidas Glover, Beard, the tenor, and other famous men belonged to this club. In 1785 the Prince of Wales joined the "Steaks," and afterwards the Dukes of Clarence and Sussex and the Duke of Norfolk became members. Other devotees were the poet Morris and John Kemble. After the burning of Covent Garden, the 'Sublime Society,' as it was called, had rooms first in the English Opera House, then in the Bedford Coffee House, and finally in the Lyceum (1838), where it remained until it disbanded in 1867. Sheridan founded a Beefsteak club in 1749, with Peg Woffington as president, and with rooms in the Royal Theatre, Dublin. The present Beefsteak Club of London was established in 1876 with rooms in Toole's Theatre. In the United States the well-known newspaper correspondents' organization of Washington, D. C., the 'Gridiron,' is in a general way similar to the English clubs. Consult Arnold, *Life and Death of the Sublime Society of Steaks* (1871).

BEEF TEA. A light article of diet for sick persons and convalescents, which should contain some of the proteids—i.e. nitrogenous nutritive material of meat, as well as the extractives—generally prepared by placing scraped or chopped lean beef in a glass jar with cold water. After standing for half an hour or so, the jar, which should be tightly covered, is placed in a saucepan of water, and gradually heated. For the first hour, the temperature should be below the coagulating point of meat protein (167° F.). It should then be allowed to boil a short time, to take away the raw taste and coagulate the red coloring matter. A little salt is then added to suit the taste. Beef tea contains very little nutriment, and also has little food value. It is the first food borne by the stomach in some cases, and it is somewhat stimulating to the appetite. It should not be given in heart-disease (where a decreased amount of fluid is desirable), gout, or kidney disease. Mutton, treated in a similar manner, yields a broth or tea which is not so easily digested, and is hurtful if the fat be not skimmed off from the liquid. A knuckle of veal affords a similar broth or tea; but it is not so light as beef tea, and, moreover, gelatinizes on cooling. A broth or tea prepared from a young chicken is, of all decoctions of animal matter, the most readily digested, and is specially suitable for invalids in cases of great irritability of the stomach.

BEEF'WOOD'. See Casuarina.

BEE-KEEPING. The *apiary* or stock of beehives should, of course, be situated in a neighborhood where flowers sufficiently abound for the supply of honey. It is, however, by no means certain to what distance bees roam. Some authors mention a mile as the probable distance; but the opinion has apparently been hazarded on mere conjecture, and there seem to be good reasons for supposing that a much greater distance might more correctly be named. But whatever distance bees may be capable of traveling in quest of honey, it is undoubtedly of great importance that they should have good feeding-ground in the immediate neighborhood of the apiary; and in many parts of the world the practice prevails of removing them from place to place, according to the season, in order that advantage may be taken of the greatest abundance of flowers. Thus in the south of Scotland beehives are very frequently removed to heath-covered tracts in the beginning of August, and remain there till the heath is out of flower; and this affords in many parts of the country the most plentiful honey-harvest, although in other parts, especially where white clover abounds, the greatest quantity of honey is obtained earlier in summer.

As to the form of beehives, and the material of which they should be made, there are great differences both of opinion and practice. Glass hives, and hives with glass windows, which can be covered at pleasure with wooden slides, are employed by those who wish to observe the movements and habits of bees; but for profitable purposes, wood and straw are the materials in common use. In some parts of Europe cylindrical cork hives are much used, made by removing the wood of a portion of the cork-tree, and leaving the bark uninjured; and hives of earthenware are common in Greece and Turkey. Frame hives, properly managed, are most successful. The hive which is most used in the United States, and which, with slight modification, has been adopted in England and her colonies, was invented by Langstroth. It is important that the owner should have facilities for giving increased room both above and below the stock-hive; increased room above is required for the reception of pure honeycomb unmixed with brood; and the capability of adding to the hive below, by raising it up an additional story, is often requisite to prevent swarming, which is incompatible with the collection of a large store of surplus honey.



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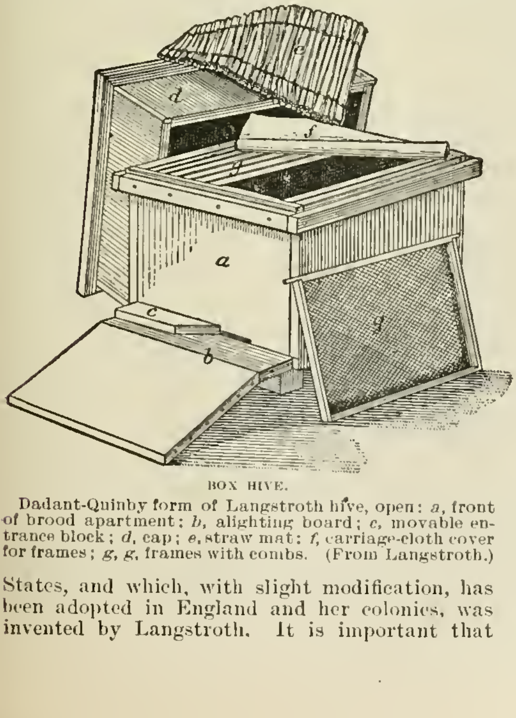

BOX HIVE.

Dadant-Quinby form of Langstroth hive, open: *a*, front of brood apartment; *b*, alighting board; *c*, movable entrance block; *d*, cap; *e*, straw mat; *f*, carriage-cloth cover for frames; *g*, *g*, frames with combs. (From Langstroth.)

Bees require attention at the time of swarming, that they may not fly away and be lost. They require also to be fed during winter, when, on account of a bad season, the lateness of the swarm, or other cause, they have not enough honey to support them. A common rule is that the weight of the contents of the hive must be at least 20 pounds, that the bees may survive the winter without being fed; and even in this case a supply of food for a short time in spring promotes the activity of the bees and their summer prosperity. The food ordinarily supplied to bees is either the coarser kind of honey or sugar and water. Strong ale and sugar boiled are also frequently given as food. The practice has very largely prevailed of killing bees by fumes of sulphur, in order to take from them their honey in the end of autumn, a portion only of the increase of the stock being kept through the winter. This practice still has its advocates; but the majority of bee-keepers take only what they can by top boxes or *supers*, or by cutting out combs, preserving all hives which are not so light that there is no good hope of their surviving the winter.

When honey is to be taken from bees, the person doing it must be carefully protected from their stings by gloves, veil, etc. It is best done during the heat of a fine day, when the bees more readily leave the combs of the *super* that is taken away, and return to their hive. A little gentle tapping generally causes them to leave the combs, and a feather is used for brushing off those which are slow to do so. The smoke of the common puffball causes them to fall down in a stupor, from which they speedily recover, and its use is very convenient. It is gathered and dried for the purpose. Chloroform is also sometimes used for the same purpose; but the effect is apt to be fatal, unless care is taken to choose the morning of a fine day, so that the stupefied bees may have time to recover in the air and sunshine. Objections which might be raised against stupefying substances for smoking bees do not apply to wood for this purpose, such as hickory or hard maple.

Bees are much less apt to sting when swarming than at other times, and in general all the necessary operations are performed without gloves or veil, and with perfect safety. The sting of a bee is to many persons a thing of no great consequence, although in some it causes great local inflammation and swelling, and general derangement of health. The application of a little ammonia usually relieves the pain; or an onion cut through the middle.

The apiary should, of course, be in a sheltered place, and where it enjoys a good amount of sunshine. The hives are very generally placed at small distances in the open ground, but some bee-keepers protect them by a shed. In the former case, each hive is usually covered with a straw hood in winter, to keep away the rain, as dampness is particularly injurious to bees. For the avoidance of damp, and to prevent the bees from coming in contact with the ground when they hang in a great cluster at the door of the hive—as they often do before swarming, when the weather is hot and the hive very populous—each hive is raised to a height of at least 15 or 18 inches from the ground. See HONEY.

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BEEK′MANTOWN′ BEDS. See ORDOVICIAN SYSTEM.

BEE-LOUSE. See FOREST FLY.

BEELZEBUB, bē-ĕl′zē-bŭb (Heb., god of flies, from *baal*, lord, and *zebūb*, fly). The name by which the people of Ekron, in Philistia, worshiped their god, Baal (q.v.), or Bel (II. Kings, i. 2). It was to this god's oracle that Ahaziah sent messengers to find out whether he would recover from his fall. It is probable that the real name of the god was Baal-Zebul ('lord of the high house'), which was changed to Baal-Zebub as a cacophonous modification, much as Baal was changed to Bosheth, 'shame,' and Malk to Moloch, etc. Later on in the New Testament he appears as the chief of the demons (Matt. x. 25, xii. 24, etc.) under the two forms Beelzebub and Beelzebul.

BEEMSTER, bām′stēr. A region in the Dutch Province of North Holland, once a lake, and reclaimed at the beginning of the Seventeenth Century. It has an area of 17,825 acres, and is very fertile and well adapted to cattle raising. The commune of Beemster has a population of 4715.

BEER (AS. *béor*, OHG. *bior*, Ger. *bier;* probably a dissimilation for **breor*, and connected with AS. *bréowan*, OHG. *briuwan*, Ger. *brauen*, to brew; another etymology refers *beer* to AS. *béo*, barley). The term beer, in its broadest sense, denotes any fermented liquor that has not undergone distillation. This definition of beer is very comprehensive, and includes many varieties of fermented liquors not commonly known as beer. The name has also a more limited meaning. In England the name beer usually denotes some form of ale, and in the United States and in Continental Europe the term is practically restricted to lager beer, which, however, is made in a variety of qualities. Brewing is the name given to the process of manufacturing beer, although, strictly speaking, the manufacture consists of two separate processes known as malting and brewing, which will be found discussed fully under BREWING. In the present article, the principal varieties of beer and their characteristics will be described briefly.

Historically, beer is of great antiquity; it was manufactured by the Egyptians and afterwards by the Greeks, Romans, and ancient Gauls. Among the ancient writers who mention beer are Herodotus, Tacitus, Pliny, Xenophon, and others. The Romans are supposed to have introduced the art of brewing beer into Britain, the only intoxicating beverages used by the Britons previous to the Roman conquest being mead and cider. Naturally the process of brewing practiced by these ancient peoples has been vastly improved upon by modern brewers, who have called in the knowledge of chemistry and bacteriology to aid them in perfecting their art.

VARIETIES. While beer is the generic name for all malt liquors, many of these liquors are known by other names, the principal of which will be enumerated and briefly explained.

Ale would seem to have been the current name in England for malt liquor in general before the introduction of hops from Germany about 1524. After this date the German word (*Bier*) beer was used at first to distinguish the hopped liquor from ale, the unhopped. As now used, ale signifies a kind of beer distinguished chiefly by its strength or high percentage of alcohol. In the manufacture of ale the first fermentation is checked, while a considerable percentage of sugar remains undecomposed, which by the subsequent fermentation in the barrels is changed to alcohol and carbonic-acid gas. The length of time which ale is left to cure in the barrels is from one week for mild ale, from two to four months for pale ale, and from ten to fifteen months for strong ale. Burton ale contains over 8 per cent. of alcohol. This is the strongest of the English ales. The Scotch ales are distinguished for the smallness of the quantity of hops used and for their vinous flavor. They are fermented at a lower temperature than English ales, which are fermented at from 65° to 90° F. India pale ale differs chiefly in having a larger quantity of hops.

Porter is a kind of malt liquor which came into use in London in 1722. According to Leigh, "the malt liquors previously in use were ale, beer, and two-penny, and it was customary to call for a pint or tankard of half-and-half—i.e. half of ale and half of beer, half of ale and half of two-penny, or half of beer and half of two-penny. In the course of time it also became the practice to ask for a pint or tankard of three-thirds (or, as it became corrupted, *three threads*), meaning a third each of ale, beer, and two-penny; and thus the publican was obliged to go to three casks for a single pint of liquor. To avoid this trouble and waste, a brewer by the name of Harwood conceived the idea of making a liquor which should partake of the united flavors of ale, beer, and two-penny. He did so and succeeded, calling it entire, or entire butt beer, meaning that it was drawn entirely from one cask or butt; and being a hearty, nourishing liquor, it was very suitable for porters and other working people. Hence it obtained the name of porter, and was first retailed at the Blue Last, Curtain Road, Shoreditch." The chief characteristics of porter are its dark-brown color, peculiar bitter flavor, and agreeable freshness in drinking. It was originally brewed with malt roasted until slightly brown; now, however, under the improved system of brewing, pale malt, with the addition of some highly roasted for the sake of color only, is used. Enormous quantities are brewed by the London brewers. A kind much stronger than ordinary porter is also extensively brewed in London, Dublin, and elsewhere, under the name of *stout*.

Lager beer, which is now so extensively manufactured in the United States, takes its name from the fact that it is kept several months in a storehouse (*Lager* in German) to cure. In the manufacture of lager beer this long storage is not usually practiced in the United States. The wort is prepared in much the same manner as for ale, and is pumped from the hop-jack into shallow coolers placed in the upper stories of the brewery, and is also passed through a refrigerator until it is reduced to a temperature of about 45° F. Thence it is carried in pipes to large fermenting tuns, placed in cool cellars, or in chambers cooled by ice or artificial refrigeration, having a temperature of 40° to 45° F. Here yeast is added, which, in the course of about three dayes, incites fermentation, this being manifested by the appearance of minute bubbles of carbonic-acid gas, which, as in the fermentation of ale, carry a little of the yeast with them. This does not, however, remain there, but, discharging the gas, to which it had adhered, settles to the bottom in the form of a viscous mass, this mass, with that which remains there, constituting what is called bottom yeast. The slow fermentation employed in the process of making genuine lager beer causes a clarification and the commencement of a ripening, which affords a beverage free from the objectionable qualities of the common beer that goes under the same name, but which is known to brewers under the name of *Schenk-bier*, or *present-use beer*. This is fermented in a much shorter time; but the fermentable matter is not all eliminated, as in the genuine article; but for the purpose of neutralizing what acetic acid might appear from the acetous fermentation, or for producing by union with it an additional quantity of carbonic-acid gas to give it 'life,' the brewer adds in the operation of casking a quantity of bicarbonate of soda, immediately upon which the bung is driven in and the beer is ready for market. Genuine lager, however, lies a long time to ripen, and attains certain qualities not possessed by any other kind of beer, and highly prized by lovers of this beverage. *Bock beer* is lager beer of extra strength, made in the spring of the year. It requires two months to brew, and in making it 1 pound of hops to 3½ bushels of malt are used.

Among the less known varieties of beer must be mentioned the following: *Mum* is a peculiar kind of beer formerly used in Great Britain and still used in Germany. Instead of only malt being used, it is made of malt and wheat, to which some brewers add oats and bran-meal. It is neither so wholesome nor so agreeable as common ale or beer. In South America the Indians prepared and drank a beer made from corn, and known as *chica*, or *maize beer*, long before the Spanish conquest. The process followed in making chica is similar to that of beer brewing. The maize is moistened with water, allowed partially to germinate, and dried in the sun. The maize malt so prepared is bruised, treated with warm water, and set aside until the fermentation is over. The chica or maize beer has a yellow color and a pleasant acid taste. In the valleys of the Sierra the maize malt is chewed between the teeth by the Indians and members of their households, and the chewed morsel, incorporated with the saliva, is put in jars with hot water, when the fermentation proceeds more rapidly than before, and a more highly prized beer is obtained. The chica is also made from barley, rice, peas, manioca, pineapples, and grapes. The Crim Tatars prepare a beer from millet-seed, called *bouza*, or *millet beer*. The same seed is used in Sikkim, on the southern slopes of the lower Himalayas, and yields beer there called *murwa*. The Arabians, Abyssinians, and many African tribes employ *teff*, the seeds of *Poa Abyssinica*, and millet-seed as sources of beer. The Russians prepare a beer from rye called *kyass*, or *rye beer*. The Tatars ferment-ed milk into *koumiss*, or *milk beer*. The Arabians used the milk to yield their *leban*, and the Turks to produce their *yaourt*. In the north of Scotland, the Orkneys, and some parts of Ireland, buttermilk, or sour milk, is allowed to stand till fermentation begins, and an intoxicating liquor results. The South Sea Islanders prepare a beer from the root of *Macropiper methysticum*, or the intoxicating long pepper, which is called *ava*.

COMPOSITION. The exact composition of beer is not accurately known, but the principal constituents are water, alcohol, dextrin or gum, glucose or grape sugar, glycerin, several kinds of acids, albumen, resin, the essential oil from the hops, and mineral salts. Ale and beer, and especially lager beer, contain considerable nutriment in the sugar, starch, and gum that they hold in solution; and in certain parts of Germany, where lager beer is very freely drunk, it seems to take the place to some extent of animal food. The bitter substances that enter into its composition appear also to exercise a mildly tonic effect. The proportion of alcohol in some of the most popular ales and lagers is as follows: Burton Ale, 8.25; Guinness's Stout, 6.81; Scotch Ale, 4.41; New York Lager, 5.86; Munich Lager, 4.70; Schenk-bier, 3.90. For statistics of production, see LIQUORS, FERMENTED AND DISTILLED, STATISTICS OF.

BEER, bâr, ADOLF (1831-1902). An Austrian historian, born at Prossnitz, Moravia. He studied history, philology, and political economy at the universities of Berlin, Heidelberg, Prague, and Vienna. In 1857 he was appointed professor at the Commercial Academy of Vienna, and in 1868 he was called to a similar chair in the technical high school in that city. As one of the foremost promoters of educational reform in Austria, he received in 1870 an important appointment in the ministry of education. He was elected to the Reichsrath in 1873, and became a member of the Upper House in 1897. The following are a few of the principal works of this prolific author: *Geschichte des Welthandels* (1864-84; *Die Finanzen Oesterreichs im 19ten Jahrhundert* (1877); *Die orientalische Politik Oesterreichs seit 1874* (1883); *Die österreichische Handelspolitik im 19ten Jahrhundert* (1891).

BEER, MICHAEL (1800-33). A German dramatic poet, born in Berlin. He won a considerable success with his tragedy of *Klytämnestra* (Berlin, 1819). His other works are *Die Bräute von Aragonien* (1819); *Der Paria* (1823), a one-act tragedy, which depicted the situation of the Jew in modern Germany, and was praised by Goethe; and *Struensee* (1829), his most successful work, for which his brother, the famous composer, Meyerbeer, wrote an overture and incidental music. His complete works were edited by von Schenk (1835), who also published a volume of his correspondence (1837).

BEER, Wilhelm (1797-1850). A German astronomer, brother of the preceding. In the Thiergarten of Berlin he built an observatory, where, with his friend Mädler, he made a particular study of Mars and the moon. His map of the moon (1836) was awarded the Lalande Prize by the French Academy. In 1849 he became a member of the Prussian First Chamber. He published *Der Mond nach seinen kosmischen und individuellen Verhältnissen* (1837) and *Die Dreikönigsverfassung in ihrer Gefahr für Preussen* (1849).

BEERE, Mrs. Bernard (1859—). An English actress. She was born at Norwich, a daughter of Mr. Wilby Whitehead. After studying as the pupil of Hermann Vezin she began her dramatic career in 1878 at the Opéra Comique, London. Her marriage, not long afterwards, took her from the stage, but she returned to it as Mrs. Bernard Beere, and in 1883 attracted notice in *Fedora,* and as the Countess Zicka in *Diplomacy.* In 1888 she played at the Opéra Comique in *As in a Looking-Glass* and *Masks and Faces.* She visited America in 1892. In 1897, after another retirement, she reappeared in *Charlotte Corday* and *A Sheep in Wolf's Clothing.* In 1900 she became the wife of H. C. S. Olivier.

BEER MON'EY. A peculiar payment to non-commissioned officers and soldiers in the British Army, established in the year 1800, at the suggestion of the Duke of York. It consisted of one penny per day for troops when on home service, as a substitute for an issue of beer and spirits. It continued as an addition to the daily pay until 1873, when, the stoppages for rations having been abolished, the opportunity was taken to consolidate beer money and pay proper.

BEERNAERT, bār'närt, Auguste Marie François (1829—). A Belgian statesman, born at Ostend. He was elected a member of the Chamber of Deputies in 1874, and in 1884 received the portfolio of Agriculture, Industry, and Art. Soon afterwards he was appointed president of the Council and Minister of Finance. He proved to be exceedingly skillful in dealing with many important questions, such as the revision of the Constitution and proportional representation in the elections. Owing to the lack of adequate party support in connection with the latter measure, he resigned in 1894. In 1895 he was elected president of the Chamber of Deputies.

BEERS, Ethel Lynn (1827-79). An American poet, born at Goshen, N. Y. Her earlier writings appeared under the name of Ethel Lynn, derived from her baptismal name, Ethelinda. By birth an Eliot, descendant of the famous New England Apostle to the Indians, she married William H. Beers, and afterwards used her full name. She is best known for the war lyric, *All Quiet Along the Potomac,* which appeared in *Harper's Weekly* in 1861. The authorship of this popular poem was soon claimed for others, especially for a Southerner; but Mrs. Beers's claim to it is indisputable. Her verses were collected just at the time of her death in a volume entitled *All Quiet Along the Potomac, and Other Poems* (1879).

BEERS, Henry Augustin (1848—). An American professor and littérateur, born in Buffalo, N. Y. He graduated at Yale in 1869, and taught there from 1871 to 1875, when he was made assistant professor of English literature, and, in 1880, professor. His chief publications are a collection of verses, *Odds and Ends* (1878); *A Century of American Literature* (1878); *Nathaniel Parker Willis* and *Prose Writings of N. P. Willis* (1885); a second collection of verses, *The Thankless Muse* (1885); *An Outline Sketch of English Literature* (1886); *From Chaucer to Tennyson* (1890); *Initial Studies in American Letters* (1891); *A Suburban Pastoral and Other Tales* (1894); *The Ways of Yale* (1895); *A History of English Romanticism in the Eighteenth Century* (1899); and *A History of English Romanticism in the Nineteenth Century* (1901).

BEERS, bārs, Jan van (1821-88). A Flemish poet, born in Antwerp. In 1844 he became a librarian of the Antwerp Library, and in 1860 professor of Flemish language and literature at the Athenæum in that city. His works include *Levensbeelden* (1858) and *Gevoel en Leven* (1869). Consult the biography by Pol de Mont (Haarlem, 1889).

BEERSHEBA, bê-ĕr'shê-bȧ (Heb. *beer,* well + *sheba,* oath, or seven), the modern Bir-es-seba. One of the Simeonite towns in Southern Judah (Joshua xix. 2), so called because here Abraham entered into an alliance with Abimelech, King of Gerar, which he ratified with an oath and a gift of seven ewe lambs. Two stories are told in explanation of the origin of the place and of the name. According to the one (Gen. xxi. 22-31), the place received its name as the 'well of oath,' because of the alliance formed here between Abraham and Abimelech, King of Gerar, which was ratified by a gift of seven ewe lambs from Abraham to Abimelech as a witness of the fact that the well was dug by Abraham. In further commemoration of the event, Abraham is said to have planted a tamarisk at the place, and to have invoked the name of Yahweh. The other account (Gen. xxvi. 26-33) ascribes the name-giving to Isaac, and apparently explains it as the well of 'seven.' Beersheba was situated in the extreme south of Palestine, about 52 miles southwest of Jerusalem. Its position led to the phrase 'from Dan to Beersheba' as comprising Hebrew territory from north to south. Various interesting events are recorded by biblical tradition as having taken place at Beersheba. It was here that Abraham received the command to sacrifice Isaac (Gen. xxii.). In later days Isaac sojourned here. Esau was robbed of his birthright and blessing here (ib. xxviii. 10), and here Jacob sacrificed to Yahweh on his journey into Egypt (ib. xlvi. 1); the sons of Samuel were judges here (I. Sam. viii. 2), and it was from hence that Elijah was forced to flee into the desert from Jezebel's wrath (I. Kings xix. 3). Leaving aside these traditions, it is clear that Beersheba was the site of an ancient sanctuary to which importance was attached by the Hebrews as late as the days of Amos (Amos v. 5). As to the name, the sanctity attaching among the Semites to the number seven makes it more plausible to explain the name as the 'seven wells' in the sense of the 'sacred well,' rather than as the 'well of oath,' which appears to rest upon a play on the name. After the captivity, Beersheba was occupied by the Jews. Two circular wells of fine pure water—the larger being 44 feet deep, the smaller 23—and a heap of ruins now mark the spot of Beersheba.

BEESLY, bēz′lĭ, Edward Spencer (1831—). An English scholar and historian. He was educated at Wadham College, Oxford, was professor of Latin at Bedford College (London) in 1860-89, and professor of history in University College (London) from 1860 to 1893. He also became editor of the *Positivist Review*. His publications include *Catiline, Clodius, and Tiberius* (1878), and *Queen Elizabeth* (1892).

BEES′TON. A manufacturing town of Nottinghamshire, England, on the Trent, 3½ miles southwest of Nottingham. It has important lace-making, machinery, cycle, and automobile factories. Population, in 1891, 6948; in 1901, 8950.

BEES′WAX′. The plastic material secreted by bees, and used by them in the manufacture of their cells. It is largely produced in Europe and in the United States, and is an important article of export from various parts of Asia and Africa. Beeswax is a solid, tough substance, having a pale yellowish-brown color, a specific gravity of about 0.96, and a pleasant odor resembling honey. It melts at 67° C. (152.6° F.). The crude wax is separated from the honey by pressure. The comb thus obtained is treated with water and heated and stirred until the wax melts. The wax is then run into a vessel of cold water, where it is further washed and allowed to solidify. As thus obtained, it is used on floors and for making sealing-wax, lithographic crayons, and mastic varnish. Crude beeswax may be bleached by exposing thin shreds of the yellow wax to air and sunlight; the resulting wax is perfectly white and has neither taste nor smell. Wax may also be bleached with nitric acid and chlorine, although the latter combines with it. Candles made of wax that has been bleached with chlorine yield, on burning, stifling vapors of hydrochloric acid. This fact, first investigated by Dumas, led to the establishment of the substitution theory in organic chemistry. The quality of beeswax is dependent upon the facility with which it bleaches. Certain varieties can scarcely be bleached at all. Bleached wax is employed in candle-making, and in modeling figures, flowers, and other similar objects.

BEET (AS. *bēte*, Lat. *beta*). A genus of plants of the natural order Chenopodiaceæ. There are about fifteen species, mostly biennials, with smooth ovate, stalked root-leaves and tall, leafy flowering stems. They are natives of the temperate parts of the Old World. The only species of economic importance is the *Beta vulgaris*. This has been in cultivation since before the Christian Era, and has been developed as a root-vegetable, leaf vegetable, and as a foliage plant. The root-vegetable varieties, cultivated in gardens, constitute our table beets. Their color and form vary from dark blood-red to scarlet and white, and from turnip-shape to long tapering forms. The earlier and smaller varieties are usually turnip-shaped. As a vegetable, the garden beet is boiled, pickled, used as a salad, and the tops cooked for 'greens.' Young beets are extensively grown as an early market-garden crop in the vicinity of all the larger cities in the United States, and are sometimes forced under glass. (See Vegetables for illustration.) Garden beets require a deep, rich, loose, well-tilled soil. The seed is sown as early in spring as the weather becomes settled, in drills 18 to 36 inches apart, and the young plants are afterwards thinned to 4 to 6 inches in the row. The wider rows permit of horse-cultivation. Some fifty varieties of garden beets are grown in the United States. Of the early varieties, Early Blood Turnip, Eclipse, Egyptian, and Bassano are standard sorts. The Mangold-wurzel, or Mangold, is the variety now usually grown for cattle-feeding. It is a coarser and very large form of the common beet. It is planted as soon as the ground can be tilled in spring, in drills 2 to 3 feet apart, and the plants are allowed to stand from 12 to 14 inches distant in the row. Further cultivation consists in keeping down the weeds, and shallow tillage. Golden Tankard, Golden Yellow Mammoth, and Mammoth Long Red are standard varieties. The sugar beet is a form of the common beet in which the percentage of sugar has been greatly increased by cultivation and selection. It is extensively grown in Central Europe, and in the northern and western United States, for the production of sugar. (See Sugar Beet.) The strain of the *Beta vulgaris*, which is grown as a leaf vegetable, is generally known as Chard or Swiss Chard, and will be considered under the head of Chard (q.v.). The foliage varieties of beets are grown for their ornamental value, and are used for bedding and for borders where strong and heavy effects are desired. The large leaves of the several varieties are richly marked with different shades of red, orange, silver white, and intermediate shades.

Beet Diseases. Beets are subject to a number of fungus attacks, some of which are confined to the leaves; others occurring upon the roots. The most destructive disease of the leaves is the leaf-spot, due to *Cercospora beticola*. The leaves are more or less covered with ashy spots, and later, by their drying up and falling away, little is left of the leaf but the frame-work. When the attack is severe, the growth and maturity of the crop is affected to a considerable degree. Bordeaux mixture (see Fungicides) will prevent this disease, if the leaves are kept well covered with it from June through the growing season. The fungus winters in the old leaves, which should therefore be collected and burned. A red rust caused by *Uromyces betæ*, and a white rust due to *Cystopus blitii*, occur on the leaves. Both will yield to applications of the more common fungicides.

Upon the roots the scab is one of the worst troubles. It is due to the same cause as the potato-scab, and will require the same treatment. A root-rot due to *Rhizoctonia betæ* is troublesome in Europe. Small roots are killed and larger ones injured by the fungus, which readily survives in the soil. On this account, where the disease has appeared, other crops should be grown for a number of seasons. This disease, so far as reported, is most destructive to sugar-beets. A bacterial disease of sugar-beets is reported. The roots are not killed, but their sugar content is considerably reduced. It may be recognized by the greater prominence of the fibres in a cut section of the root by the difference of color, and by less solid structure. No certain means for its prevention are known.

BEET, Joseph Agar (1840—). An English divine, lecturer, and author. He was born at Sheffield, was educated at Wesley College, Sheffield, and at Wesleyan College, Richmond; was engaged for twenty-one years in pastoral work, and then accepted a call to the chair of systematic theology at Wesleyan College, Richmond. He delivered the Fernley Lecture on the "Credentials of the Gospels" in 1889, and came to America in 1896, where he gave a series of lectures at the University of Chicago, at the summer schools of Chautauqua, and at Ocean Grove. Two of his theological works have been translated into Japanese, and have been adopted as text-books in Japan. His publications include: *Commentaries on Saint Paul's Epistles; Through Christ to God; The New Life in Christ; The Last Things* (1897)—in all of which he brings the methods of science and philosophy to bear upon the theological questions which he treats.

BEETHOVEN, bā′tȯ-*ven*, Ludwig van (1770-1827). A German composer, the greatest master of the classical school. He was born December 16, 1770, at Bonn. His father was Johann van Beethoven, tenor singer in the Chapel of the Elector of Cologne, who had married Maria Magdalena Laym, a widow, the daughter of a cook, named Kewerich, at the Elector's palace. The father's income was small (about $150), and he began Ludwig's musical education at four years, in the hope of making money with him as a musical prodigy. The boy's talent was obvious. Van den Eeden and Neefe were among his teachers. Neefe employed the eleven-year-old boy as his assistant at the organ in the Elector's Chapel, and prophesied that he would become 'a second Mozart.'

In 1784 he was appointed second Court organist, with a salary of about $75. At this time several music lovers in Bonn, among them the von Breunings, extended aid to the family on account of the interest they took in the boy, and in 1787 the Elector Max Franz paid his traveling expenses to Vienna. There he met Mozart, who was so surprised by the boy's powers of improvisation that, stepping softly into the next room, he whispered to his friends: "Mark him well; some day he will make a stir in the world."

Beethoven was summoned from Vienna to his mother's deathbed. Her loss was a severe blow to him. His father, shiftless and a drunkard, had been a hard taskmaster, but his mother had been kind and gentle; "my best friend," he calls her in one of his letters. Beethoven now began to give lessons, and to play occasionally in public. Notwithstanding his unpleasing home surroundings, he must have had natural refinement, for he became intimate in several families of high standing. His early friends included, besides the von Breunings, Archduke Rudolph, Baron Van Swieten, and Count Waldstein. These names, and those of future intimates, are found among his dedications (e.g. the *Rasoumowsky Quartettes*, the *Waldstein Sonata*).

From this period dates an early love affair with Babette Koch, the pretty daughter of the proprietress of the Zehrgarten. She subsequently became Countess Belderbusch. The affair terminated in 1792, when the Elector sent Beethoven to Vienna, where he became a pupil of Haydn and Albrechtsberger in theory and composition, and of Schuppanzigh in violin.

With Haydn he studied Fux's *Gradus ad Parnassum*, and there exist over 200 of his exercises, only 42 of which Haydn corrected. Neither the latter nor Albrechtsberger appreciated his pupil. Beethoven asserted that he had not learned anything from Haydn. Haydn criticised the three pianoforte trios (*Opus I.*), at least one of which, the *C minor*, is a masterpiece, in a manner which betrayed his lack of sympathy, and advised against their publication; Albrechtsberger despaired of Beethoven because his originality often asserted itself by breaking away from rule and rote. Such disregard of tradition was characteristic. His friend and pupil, Ferdinand Ries, relates that he once called the composer's attention to consecutive fifths in the *C minor Quartet*, and in the discussion which followed enumerated various theorists who forbade them. "They have forbidden them!" cried Beethoven. "Well, I allow them." With Schuppanzigh he got along very well, and when later the violinist became very fat, Beethoven playfully dubbed him 'My Lord Falstaff.'

The trios, *Opus I.*, were played at Prince Lichnowski's, one of the noble patrons whom the composer had already found in Vienna. In his association with these noblemen, Beethoven always preserved his independence of character. He considered that his genius made him the equal of any one. Once, when the 'van' before his name had been mistaken for a mark of nobility, he placed his hand successively to his head and over his heart with the exclamation, "My patent of nobility is here, and here!" Prince Lobkowitz having at a rehearsal ventured a remark which Beethoven considered ignorant, the composer, after the rehearsal, ran into the courtyard of his patron's palace and shouted, "Ass of a Lobkowitz! Fool of a Lobkowitz!"

Self-reliance was an equally conspicuous trait of his character. His brother Johann, whose wealth had made him arrogant, once called on Beethoven, and, not finding him at home, left his card:

JOHANN VAN BEETHOVEN,
Land Proprietor.

Beethoven returned the card, with the added inscription:

LUDWIG VAN BEETHOVEN,
Brain Proprietor.

Moscheles submitted to him the MSS. of the pianoforte arrangement of *Fidelio*, on which was inscribed "With God's Help." Beethoven returned it with the addition, "O man, help thyself." It must not be inferred from this that he was not religious. He was a Roman Catholic; and that he was deeply religious is vouched for by his lifelong friend, Pastor Amenda. These facts are mentioned thus early in this biography because they show why Beethoven was able for years to bear up under an infliction which would have crushed a less self-reliant and devout nature. The deafness which crept over him, and which to a composer must have seemed even more terrible than blindness to a layman, did not come to imbitter merely the closing years of a happy life. Beethoven was stone-deaf before middle age, and had been for

LUDWIG VAN BEETHOVEN

FROM A PAINTING BY CARL STIELER, IN THE POSSESSION OF THE COUNTESS VON SAUEMAN, BERLIN

several years conscious of the affliction in store for him. In a letter to Amenda, in 1800, he begs him to keep his deafness 'a profound secret,' so he must have been fully under its cloud when he was only about thirty.

Beethoven was famous as a pianist. He made his début in Vienna in 1795, with his C major concerto, and created a great impression; he also played at a benefit concert for Mozart's widow and children. He was, moreover, beginning to make a great stir as a composer. Omitting his juvenile works, which were not remarkable—Beethoven was not precocious as a composer; his genius unfolded itself slowly—he had completed, among other works, besides the trios already mentioned, the first set of pianoforte sonatas, the *Sonata Pathétique*, the six quartets dedicated to Prince von Lobkowitz, and, most important of all, his *First Symphony*. Of the ballet music to *Prometheus*, which also belongs to this period and had a successful run at the Burg Theatre, it is told that when Haydn praised it Beethoven remarked, "But, lieber 'Papa,' it is far from being a *Creation*." Haydn was much put out by the remark. "Yes, indeed," was his reply. "And I doubt if its composer ever will produce one." At that time, of course, Haydn was by far the more famous.

The pathetic story is told that Beethoven first realized he was completely deaf when, during a walk in the country with his pupil Ries, the latter pointed to a shepherd who was playing the "Schalmei." Beethoven could not hear a note. "What humiliation," he wrote in his so-called *Will* (a letter to his brothers, dated October 6, 1802), "when some one near me hears the notes of a far-off flute or a shepherd's pipe and I do not!" However, his resolution rose superior to his misfortune. "I will grapple with fate; it shall never drag me down." Henceforth Beethoven's life was a practical application of the letter and spirit of this resolution. It was a life of unremitting industry. Beethoven did not 'shake music out of his sleeves' (as did Schubert, for example); everything he composed was carefully thought out and intellectually tested, as his musical sketch-books show, so that the great number of his works is proof of intense application as well as of genius.

Considering the pathetic character of his affliction, his productiveness in the years immediately following it gives evidence of unsurpassed fortitude. Among the works produced during the five years succeeding his letter to Amenda are the pianoforte sonata with the familiar funeral march, the so-called *Moonlight Sonata* (not thus named by Beethoven); the *Second Symphony;* the *Kreutzer Sonata*, for piano and violin; the *Eroica Symphony* (3d), the *Waldstein* and *Appassionata* sonatas, and in 1805 his opera, *Fidelio* (revised in 1806 and 1814).

The *Moonlight Sonata* is dedicated to Countess Giulietta Guicciardi, "who loves me, and whom I love. Unluckily, she is not in my rank of life." This romantic attachment and the chaste beauty of the first movement have caused the name 'Moonlight' to cling to the composition. Beethoven's love affairs were by no means few. They include Eleonora von Breuning, who made woolen comforters for him, but married another; Countess Therese von Braunschweig (*'unsterbliche Geliebte'*), whom, as a pupil, in 1794, he had rapped over the knuckles, and who became engaged to him in 1806, the engagement being broken after four years; Bettina Brentano; and Marie L. Pachler-Koschak, whom "alone I wished to possess, but never shall call mine." Countess Erdödy, whom he calls his 'confessor,' and whom he addressed as 'Dear, dear, dear, dear, dear Countess,' erected a memorial temple to him in her park. The aristocratic women who were his friends make a large list, and no composer's dedications contain so many names familiar in the 'high life' of his day. As he was unprepossessing in appearance and not infrequently 'a little blunt, not to say uncouth' (Spohr, *Autobiography*), it must have been by sheer force of his genius that he held sway in the houses of wealth and nobility.

The *Eroica*, aside from its musical value, is interesting as an index to Beethoven's political views. He was a believer in republican government; and until 1804, before Napoleon had made himself Emperor, he represented to Beethoven the ideal soldier and statesman. Beethoven himself entitled this symphony *Napoleon Bonaparte*, and dispatched the original score for presentation to Napoleon. But before the presentation could be made, Napoleon had assumed the imperial purple. When Beethoven learned of this he tore the title-page from his copy. After Napoleon's death at Saint Helena, he remarked, "I already have composed his funeral march," referring to the *Marcia Funebre* in this symphony.

Fidelio was a failure on its first presentation (Vienna, November 20, 1805). The French had entered the city, the singers and the orchestra complained of the difficulty of the music, and for various other reasons the time was unpropitious. After three performances it was withdrawn. The following year, at Prince Lichnowski's, Beethoven met by appointment the two singers, Roeckel and Meyer, who suggested, among other changes, the remodeling of the work from three to two acts, its present shape. At first Beethoven was furious, and matters were not settled until 2 o'clock in the morning, when the Prince ordered supper. The most famous Leonora of Beethoven's day was Mlle. Schröder (afterwards Schröder-Devrient), whom, after a performance, he patted on the cheek and promised another opera. Of the four overtures to *Fidelio*, the *Leonora No. 3* is the most famous.

Among his compositions in 1806 were the *Fourth Symphony* and the violin concerto; in 1807 the *Coriolanus Overture* and the *Mass in C;* in 1808 both the *Fifth* and the *Sixth* (*Pastoral*) symphonies. "I am convinced that no one loves country life as I do. Every tree, every shrub seems to understand my mute appeals and responds to them" (Beethoven to Baroness Droszdick). In the garden at Schönbrunn is a spot between two ash trees which is carefully preserved because Beethoven haunted it while he was composing parts of *Fidelio*. He had a passion for the country, and it was fitting he should express it in a symphony.

During this two-symphony year (there was another in 1812, when the *Seventh* and *Eighth* symphonies came only four months apart) he received from Napoleon's brother, Jerome, King of Westphalia, an offer of the Court conductorship at Cassel. But in order to keep him in Vienna, an annuity of 4000 florins was provided by Archduke Rudolph, Prince Lobkowitz, and Count Kinsky. The allegation that the Viennese neglected Beethoven as they did Mozart and Schubert appears to be erroneous. Although his genius may not have been fully appreciated, he was far from being overlooked. He found frequent opportunity to bring his works forward at private and public concerts, and his renown as a pianist was such ("his grand style of playing," "giant among players"—Tomaschek) that, in spite of his deafness, he was practically forced to appear in concerts as a solo-player until 1813. Nor, perhaps, would he have retired then save for an untoward incident described by Spohr in his autobiography. Beethoven was playing one of his own concertos, but at the first *tutti* forgot that he was not conducting, sprang from his seat, and began directing. At a *sforzando* mark he threw out his arms so far that he knocked the lights from the pianoforte. Enraged, he made the orchestra begin over again. Seyfried, fearing a repetition of the incident, detailed two boys to hold the lights, with the result that one of them, who stood too near, received, with Beethoven's next violent gesture, a blow on the mouth which caused him to drop the light, while the other boy, who had watched Beethoven closely, dodged the blow by stooping suddenly in such a comical way that the audience was convulsed with amusement. His last public piano playing was the accompaniment to *Adelaïde* in April, 1816, for Franz Wild. As a pianist in private houses, especially those of his noble patrons, Beethoven was in frequent demand. Occasionally, however, he refused to comply with their requests to play, and at Count Browne's he stopped a duet with Ries, and declined to continue or to allow his pupil to play again, because he had been annoyed by two persons starting a conversation. After his retirement as a pianist, in 1813, he still appeared occasionally as a conductor. As late as 1822 he attempted to conduct *Fidelio*, but was obliged to leave the orchestra.

The years 1812 and 1813 saw the composition of two works which are curiosities among Beethoven's productions. These are the so-called *Battle Symphony* (the *Battle of Vittoria*), written to commemorate Wellington's victory in Spain, and introducing *Rule Britannia, God Save the King*, and *Malbrook;* and *The Glorious Moment*, a cantata celebrating the Congress of Sovereigns at Vienna. The year 1817 is important, because of the beginning of the *Ninth Symphony.* In the following year he took up the great *B flat Sonata, Opus 106*, and the *Mass in D*, the latter dedicated to his patron, Archduke Rudolph. The symphony was not finished until 1823.

In addition to his deafness, a family matter had greatly afflicted Beethoven since 1815. He was scrupulous in his duty to other members of his family. His brother Karl had been more or less dependent upon him for support, and when, in 1815, Karl died, he charged the composer with the care of his son, also named Karl. The widow, whom Beethoven considered unfit for such a charge, desired to keep the child, and a four-years' expensive litigation followed, resulting in Beethoven's favor. The nephew proved a scapegrace, and ill requited Beethoven for the care the composer lavished upon him, denying himself necessaries in order to provide for the boy's education and future. He placed him at the University, only to see him expelled. This reckless nephew was also discharged in disgrace from the army, and ordered to leave Vienna. An unsuccessful attempt at suicide further added to the troubles brought upon his uncle. In fact, he was indirectly the cause of the composer's death.

Through all these worries, with attacks of illness added to them and to his deafness, Beethoven labored on. The *Ninth Symphony* was finished in 1823. The idea of setting music to Schiller's *Ode to Joy* had occurred to him as far back as 1793, when he was 23 years old. Even after such a long lapse of time his method of introducing its choral setting in the finale was an inspiration of the moment. "I have it, I have it!" he cried one day to Schindler, and holding out his sketch-book, showed him the recitative phrase which he just then had devised: "Let us sing the immortal Schiller's song—the *Ode to Joy*."

The symphony was performed after but two rehearsals at the Kärntnerthor Theatre, Vienna, May 4, 1824, under Beethoven's direction. At the conclusion, the ovation was so great that the police were called in to quell it, for fear it might lead to public disturbance. Amid it all stood the deaf master, unconscious of the impression the work had made, until some one touched his hand and caused him to turn around; when the audience, realizing the pathos of the scene, broke into a new demonstration, in which tears mingled with the acclaim. The *Last Quartets* were composed between 1824 and his death. The finale of the *B flat Quartet, Opus 130*, finished in November, 1826, is Beethoven's last composition.

In the late autumn of 1826 Beethoven set out for Krems to consult his brother Johann, a man of considerable means, concerning Karl's future. Relations between the two brothers had been strained, owing to Johann's marriage with a woman of loose character, and to his arrogant demeanor. The visit failed of its purpose, and early in December Beethoven was forced by his brother's refusal to provide a closed conveyance, to make the return journey of two days in an open wagon. The exposure aggravated a stomach trouble from which he was a chronic sufferer; and inflammation of the lungs, and subsequently dropsy, set in. Almost to the last he displayed interest in his art. He looked over Schubert's songs, which were new to him, and praised them, and studied a forty-volume edition of Handel, whom he admired greatly. Friends sought to minister to his wants. Schubert called upon him, and Hummel and his wife, Stephan von Breuning, and Schindler were among those at his bedside. He died during a terrible thunderstorm. Almost his last utterance was, "*Plaudite, amici, comœdia est finita;*" and his last words were, "I shall hear in Heaven." Although he had applied to the London Philharmonic for financial assistance on the plea of his illness and impoverished condition—an appeal to which the Society nobly responded with £100—he was found to have been possessed of several thousand florins in bonds, which readily could have been converted into money. It is believed that he had laid them aside for his nephew, and scrupled to use them even in his own dire necessity.

Beethoven stands for the highest achievements in the classical symphonic, or, strictly speaking, sonata form. From the point at which Haydn and Mozart had left the symphony, he developed it to an extraordinary degree. The 'working out' became more free and extended; he added the *coda;* and, above all, he made the form such a vehicle for expressing emotion as his predecessors had not even dimly imagined. Wagner says, of the *Ninth Symphony*, that in the movement preceding the *Ode to Joy*, instrumental music speaks its last word, and that any attempt to go further would be to go backward. Indeed, upon this view Wagner rests his device of the music drama—viz., that, instrumental music having reached its climax with Beethoven, the only way for music to progress was in its union with dramatic and pictorial art. Without going as far as Wagner in giving Beethoven the last word in instrumental music, he did speak the last word so far as the Classical School is concerned, just as Bach did with the Contrapuntal School. Beyond Beethoven the Classical had nothing to say; and the way was clear for the Romantic School and for Wagner, with whom and Bach Beethoven forms the great triumvirate of music, each focusing upon himself an epoch. How advanced he was for his time is shown by his use of the opening theme of the *Fifth Symphony* (which is said to have been characterized by him as 'Fate knocking at the door') with much of the plasticity of a leading motive. In the first movement, though the main theme, it is used also as the accompanying figure to the second theme. In the *scherzo* (the first *allegro*) it becomes gay, almost *chic;* in the final allegro, again tragic. The *scherzo,* as a symphonic movement, is a Beethoven creation, usually substituted for the minuet.

The *allegretto scherzando* of the *Eighth Symphony* is perhaps in one respect the most exquisite specimen of his art. While everything Beethoven composed has its own characteristics, it also bears his personal impress. The nine symphonies differ from one another, yet all are unmistakably the work of Beethoven. This is, however, true in a less degree of the first and second, which show traces of Haydn's and Mozart's influence. From the *Eroica* to the *Eighth*, inclusive, the symphonies are Beethoven as the world best knows him. With the *Ninth* a more subjective treatment is employed, and the form is larger, owing to the addition of vocal effects.

Beethoven's three styles or periods, as indicated above, are as obvious in his sonatas and chamber music as in his symphonies, though there may not be an exact correlation of year and opus number.

The *Last Quartets* and the *Last Sonatas* (following *Opus 106*) are, like the *Ninth Symphony*, subjectively treated, and with this symphony are ranked by most musicians as his greatest works. His chamber music is constantly played. The modern masters of pianoforte composition (e.g. Chopin), who wrote with due regard for the capacity and limitations of the instrument, have caused Beethoven's pianoforte sonatas to be less valued from the purely pianistic point of view. Beethoven's thought was essentially orchestral, and the sonatas show this. At one time a pianist stood or fell by his ability to play Beethoven. Now the more modern repertoire is taken as the test. It must not be inferred from this that Beethoven's sonatas have disappeared from concert programmes: but they figure more rarely, and recital programmes made up wholly of Beethoven sonatas are not as frequently attempted as formerly.

Among his songs, the lovely *Adelaïde* and the cycle *To the Absent Beloved* are the best known. In church compositions, Beethoven composed *The Mount of Olives* (*Christus am Oelberge*): a mass in C and one in D, the latter one of his most advanced works. "What have you been up to now?" asked Prince Eszterházy, in whose chapel the *Mass in C* was first performed. The free and even personal treatment of sacred themes, which in a still greater degree characterizes the *Missa Solennis* (D), seemed utterly strange to Beethoven's patron.

Fidelio is still in the German repertoire, and is occasionally revived in the United States for some great prima donna, to whom the aria *Abscheulicher* and the dramatic side of the title rôle offer great scope. The effect of the work as a whole is greatly lessened by its mediocre libretto, and by the fact that, with his orchestral habit of thought, Beethoven wrote orchestrally even for the voice; so that it is only when a great climax is reached, as in the *Abscheulicher* aria, that the voice breaks through the limitations of his method.

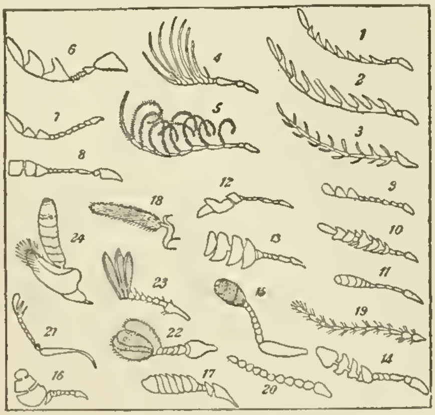
To sum up, then, Beethoven's service to music, it must again be insisted that it lies mainly in the emotional warmth and life with which he endowed the sonata form, especially as found in the orchestral symphony. In doing this he amplified the scope of every orchestral instrument, and to his successors he left an orchestra capable of responding to every modern demand. Wagner's orchestra, essentially, is Beethoven's, with a larger number of instruments in each group. There are also certain grand personal traits reflected in his music—an intellectual balance which gives stability to his work and inspires reverence for his art.

Bibliography. The standard biography of Beethoven is that of A. W. Thayer, an American, who, however, did not live to complete the work. The book (3 volumes) so far, although written in English, is published only in German translation. Consult, also, for minor biographies: Crowest, *Life of Beethoven*, in "Great Tone Poets" (London, 1881); Rudall, *Life and Works of Beethoven*, "Great Musicians Series" (London, 1889); Nohl, *Beethoven Depicted by His Contemporaries* (Eng. trans., London, 1880), and *Life and Works of Beethoven*, translated by J. J. Lalor (London, 1881); Schindler, *Biographie von Beethoven*, with many personal letters and characteristics (Münster, 1860); and *Beethoven's Letters* (1790-1826), translated by Lady Wallace (London and New York, 1866). For critical works, consult: Wagner, *Essay on Beethoven*, translated by Parsons (New York, 1883); Elterlein, *Beethoven's Pianoforte Sonatas*, translated by Hill and Grove (London, 1875); *Beethoven and His Nine Symphonies* (London, 1896). Fiction: Rau, *Beethoven* (Frankfort, 1859); Wagner, *A Pilgrimage to Beethoven*, translated by Weyer (Chicago, 1897). Many Beethoven relics are to be found in his birthplace in Bonn, a house which in 1889 was converted into a Beethoven Museum.

BEE'TLE, (AS. *bītel*, *bētel*, literally 'biter,' from *bītan*, Engl. *bite*). An insect of the order Coleoptera, which seems to be wingless when at rest, but really possesses two pairs of wings. At rest one pair is folded beneath two horny cases that fit over the back and meet in the median dorsal line. These horny cases are the elytra or wing-covers, which are only the modified forewings; and they distinguish beetles from all other insects save the earwigs, which are easily separable upon other grounds.

The slight protection afforded by this armature seems to be very advantageous to beetles, for they form the largest order of existing insects. "In bodily form," says Dimmock, "the Coleoptera present every variation from long cylindrical to nearly globular, from hemispheres to extremely flattened disks, from straggling ant-like forms to compact seed-like ones." All, nevertheless, exhibit a division of the body into three parts, which, however, are not the typical head, thorax, and abdomen, but a modification of these—head, prothorax or fore body, and mesothorax and metathorax combined with the abdomen into a hind body.

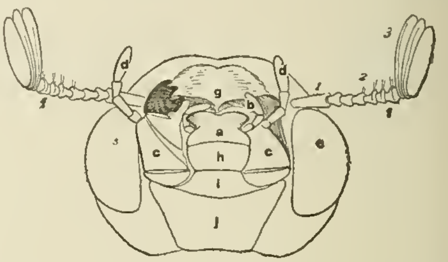
The Head bears various appendages, and the mouth opens forward or downward. The mouth parts are strong, equably developed, and adapted both for gnawing and for seizing prey. The mandibles are large and strong, and in the males of some forms reach a great size. (See STAG BEETLE.) The Curculionidæ, or snout beetles, have a long beak, but it is a prolongation of the head in front of the eyes, and not of any of the mouth parts.



FORMS OF ANTENNÆ OF BEETLES.

Serrate antennæ and modifications: 1, Serrate (Ludius); 2, Pectinate (Corymbites); 3, Bipectinate (Prionocyphon); 4, Flabellate (Acneus); 5, Plumose (Dendroides); 6, 7, 8, Irregularly Serrate, approaching Claviform (Clavate Antennæ); 9, Trogosita; 10, Catoptrichus; 11, Colon; 12, Bryaxis; 13, Anogdus; 14, Liodes; 15, Epicrus; 16, Phymaphora; 17, Heterocerus; 18, Adrnnes, Capillary and Verticillate; 19, Moniliform (Dasycerus); 20, Lamellate (Rhyssodes); 21, Lucanus; 22, Bolbocerus; 23, Irregular (Lachnosterna); 24, Dineutes.

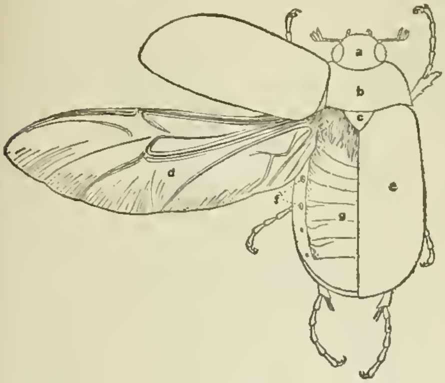
The eyes are compound, and usually large and effective, except in a few cave-dwelling species. (See CAVE ANIMALS.) Ocelli are absent, as a rule, in the adult form, even where possessed by the larvæ. The compound eyes vary greatly in form and appearance and number of facets, and sometimes are divided into upper and lower parts, so that the insect is really four-eyed; this is especially the case in some water beetles, which may thus see what is going on both above and below the surface of the water as they swim. The antennæ (most commonly eleven-jointed) are placed just in front of the eyes, and are organs not only of touch, but of smell and probably of hearing. They appear under a variety of forms, some of which are pretty constant throughout large groups, giving them such names as clavicorn, lamellicorn, serricorn, longicorn, etc. "The antennæ are said to be clavate when thickened at the extremity, in the form of a club or knob; lamellate, when three or more of the terminal joints spread out in broad processes which lie flat upon one another; serrate, when the joints have on one side short angular processes like the teeth of a saw; pectinate, or comb-like, when the processes are fairly long and stand out nearly at right angles; or flabellate, if the processes are proportionately very long." It is believed that the senses of smell and hearing reside in the antennæ. The former is evidently well developed in most, if not all, beetles, while the latter seems certainly possessed by many. The tapping of such species as the 'deathwatch' implies a listener of the same kind; and similar evidence is furnished by the fact that longicorns and some other beetles are often capable of producing sound by stridulating or rubbing together various external hard parts of the body, such as wings and legs, or surfaces and angles on the prothorax and metathorax; they produce some tones that man is incapable of hearing. These organs are possessed chiefly by the males; and a résumé of facts relating to it and to many other characteristics distinguishing the sexes of beetles may be found in Chapter X. of Darwin's *Descent of Man* (London, 2d ed., 1874).



HEAD OF A BEETLE.

Arrangement and names of mouth-parts: *a*, Labium; *b*, Labial palpus; *c*, *c*, Maxillæ; *d*, *d*, Maxillary palpi; *e*, *e*, Eyes; *f*, *f*, Antennæ (1, pedicle; 2, scape; 3, flagellum); *g*, Mandibles; *h*, Mentum; *i*, Submentum; *j*, Gula.

The Fore Body forms the second well-marked division of a beetle, and consists of the prothorax, which in Coleoptera is not united solidly with the two other thoracic segments, but connected movably with them. "Its tergite (pronotum) is a very prominent feature in all beetles, reaching back to the origin of the elytra." It is hollowed forward to receive the head, and in some groups it is modified in form or possesses horns and spines of extraordinary appearance. These, as a rule, are seen only in the males, however, and most prominently among the lamellicorns. This fore body wears the foremost pair of legs, with which the hinder pairs may or may not agree. Beetles use their legs more than their wings. They do fly, but less frequently and skillfully than they run, jump, climb, swim, and burrow. Most of them are extremely active, and hence have well-developed legs and feet. These are all much alike in the ground-runners and tree-climbers, but variety is found among those of more special haunts and habits. Thus, the jumpers have very long hind legs, with thickened femora; the diggers have thickened fore legs, with claws turned into excavators; the aquatic beetles have all or a part of their legs disposed as oars, and made broad and flat and bordered with bristles. The parts of the legs vary considerably, and with such regularity that the form of the coxa is used as one of the main standards in classifying families, while larger groups—Pentamera, Tetramera, etc.—are based on number and characteristics of joints in the tarsi. "The tarsal joints are hairy beneath, and those of the anterior (and sometimes also the middle) pair of legs of many male beetles are modified to clasp more firmly the female during copulation." The most peculiar of these modifications is seen among water beetles (Dysticidæ). The legs of larvæ are often reduced to mere rudiments, or are absent.

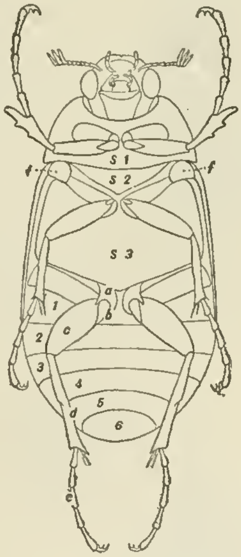


BACK OF A BEETLE.

a, Head; *b*, Prothorax; *c*, Scutellum of mesothorax; *d*, A hind wing; *e*, Elytra (front wings); *f*, Spiracles; *g*, Segments of abdomen.

The Hind Body is made up of the two posterior thoracic segments and the abdomen, and is entirely hidden from dorsal view in most beetles by the wing covers, but the parts can be well seen on the ventral surface. To the mesothorax are attached the middle pair of legs and the wing covers, while the metathorax supports the hindmost legs and the membranous flying wings, which, when not in use, are curiously folded out of harm's way under the elytra, which also shield the soft-skinned abdomen. The elytra are not instruments of flight, except that they may be useful as balancers, when held out at right angles. They shut close together upon the back when at rest, and in some forms are closely united by a suture along the median line; or, in the case of certain running beetles, where the wings may be greatly aborted or perhaps may even be altogether absent, particularly in the female sex, the elytra may even be wholly grown together into one shield. The elytra may be smooth and plainly colored, or may be highly polished, striated, pitted, and sculptured in a great variety of ways, as usually occurs in the terrestrial families. They may also bear spines, few or many, long and short, tubercles, and other prominences, or be clothed with pubescence or scattered hairs or scales or waxy secretions. "The excessive brilliancy and sparkling coloration of the diamond beetle of Brazil . . . is due to its being covered with scales; this . . . is common among the weevils (Curculionidæ) and not rare in a few other families of Coleoptera." Beetles exhibit almost every known shade of color (see Plate), and a few are iridescent, with beautiful metallic hues. A little beetle (*Coptocycla aurichalcea*), not uncommon on the wild morning-glory (Convolvulus), looks, when alive, like a flattened drop of the finest polished gold. The species of certain families resemble one another in coloration and figuration; the leaf beetles (Chrysomelidæ) have, for the most part, brilliant coloration; the ladybirds (Coccinellidæ) have, for prevailing colors, red, yellow, and black, mostly arranged in round or roundish spots" (Dimmock). As a general rule those whose lives are passed in the open sunlight are more bright in color than those that habitually dwell in cavities, under stones or water, or in the dark.

Habits and Food. Beetles dwell in the greatest variety of situations, and in nearly all parts of the world. A few live in salt water, more in fresh waters, and a limited number breed in hot springs. Under great stones and in caves dwell a good many blind beetles, the degeneration of the visual organs in some of which has proceeded so far as to include even the optic nerves and lobes. Certain other forms are parasites in other animals or are to be found in the nests of termites and ants; for the very interesting facts of this association, see Symbiosis.



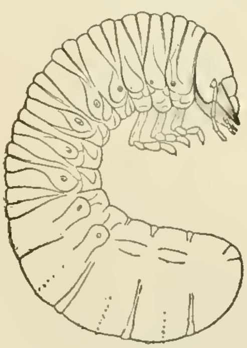
UNDER SIDE OF A BEETLE.

s 1, Prosternum; *s* 2, Mesosternum; *s* 3, Metasternum; *f*, *f*, Epimera of mesothorax; 1, 2, 3, 4, 5, 6, Joints of abdomen. Joints of hind legs: *a*, Coxa; *b*, Trochanter; *c*, Femur; *d*, Tibia; *e*, Tarsus.

The food of beetles and their young is as diverse as their habitats. A vast number of them, such as Hydrophilidæ and Chrysomelidæ, feed on vegetable matter, both living and dead, above or below ground. Still another vast host, Cicindelidæ, Carabidæ, Dytiscidæ, and Coccinellidæ, live on animal food, which either the adults or their predaceous larvæ capture alive, or appropriate when found dead, according to the custom of the species. In this fondness for decaying and excrementitious matter, often minute in quantity, they perform an excellent service.

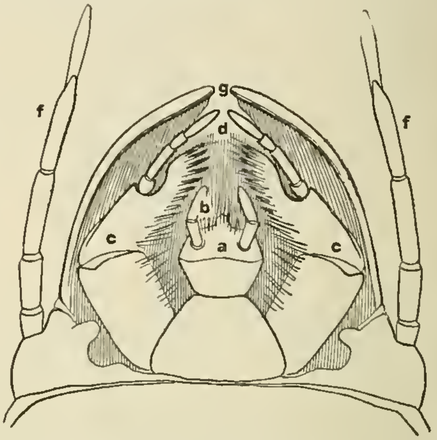
Enemies and Defenses. Birds, rodents, frogs, toads, and reptiles all prey upon beetles, both adult and larval. Flies, wasps, mites, and predaceous beetles feed on them, or lay eggs within them which develop at the expense of the strength and substance of their host. They are infested with parasitic worms and protozoa, fungi destroy them, and inclement weather and lack of food help to reduce their ranks. Against these adversities various beetles are more or less protected by having a coloration like that of soil, leaves, or the bark of trees, while certain others look like excrescences on the leaves of their food-plants, or caterpillar-dung, and still others hide themselves under heaps of their own frass. A few look like sticks and seeds, the cocoons of one form resembling the seed-pod of the food-plant. A good many feign death by dropping to the ground. The bombardiers (q.v.) shoot at a pursuer. The abdomen of a number of beetles is held up in a warning attitude, as if to sting. Certain longicorns have the disagreeable taste and smell of fireflies, and even possess yellow markings in the region occupied by their luminous disks. For the luminescence characteristic of the Lampyridæ, etc., see Fireflies and Luminosity of Animals.

Economic Importance. The Blister-beetles (q.v.) are used to make blister-plasters, particularly the one commonly known as Spanish-fly. The grubs of various beetles are roasted and eaten by both white men and natives of the tropics; and the Romans, according to Pliny, fattened certain grubs (Cossus) with flour, to prepare them for the table. This 'Cossus' was probably a member of the genus Prionus, the larvæ of which are still eaten in some parts of the world. The hard parts of brilliant tropical species are often mounted as jewels to form pins, cuff-buttons, hat-pins, belt-buckles, and the like. Fireflies sewed in gauze are used by Cuban women to adorn ball dresses. Many beetles, such as those of the ladybird family, prey on plant-eating insects; others, such as carrion and dung, and the burying beetles, place theirs upon table refuse, and a great many beetles fertilize flowers. Taken as a whole, however, beetles are economically injurious; for they ravage growing and stored crops, living wood, lumber, both sawed and manufactured, carpets, furs, hides, woolen goods, cured meats, books, and zoölogical collections. The Dermestids (q.v.) are especially pestiferous.



LARVA (GRUB) OF A BEETLE.
The legs spring from the three thoracic segments; the remainder of the body consists of abdominal segments.

Life-History. Owing to the difficulty of rearing beetle larvæ, we know comparatively little of the life-history of beetles. All undergo complete metamorphosis. The eggs are laid in the situations where the economy of the species demands that the grub should be born, in order to maintain itself—that is, upon or within access of its food. Thus aquatic beetles lay their eggs in the water, leaf-eaters upon plants, wood-borers beneath the bark and in crevices of timber: the weevils upon tender seed-pods or young seeds, and so on. The scarabs (see Dung-Beetle and Scarab) roll up their eggs in a ball of dry dung, and the burying beetles place theirs upon the carrion which is buried to await the hatching of the young. When the eggs are not laid so late as to be intended to remain dormant over winter, they hatch quickly, and the larva begins at once to feed upon its intended fare.

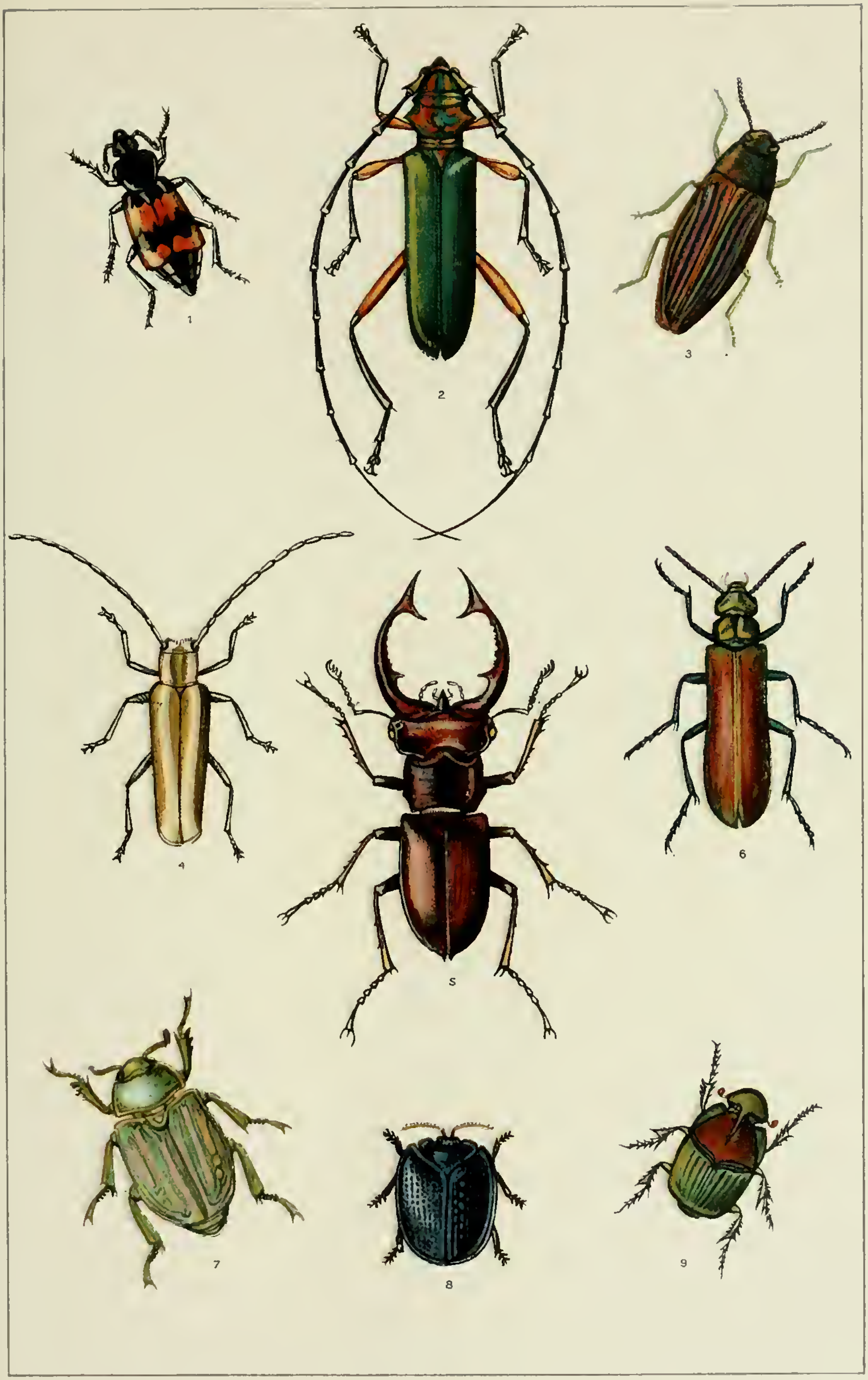


HEAD OF A BEETLE LARVA.
a, Labrum; *b*, Labial palpus; *c*, *c*, Maxillæ; *d*, Maxillary palpi; *f*, *f*, Antennæ; *g*, Mandibles.

The larvæ are commonly called 'grubs,' are usually whitish or of dull, inconspicuous hues, and ordinarily have three pairs of legs, one pair for each of the first three thoracic segments, which may vanish in older stages; but grubs that live within their food may be legless. Grubs may possess traces of still other legs, a number of them having a pseudopod on the posterior end of the abdomen. Like adult beetles, grubs have mandibulate mouth-parts, and certain forms have channels in the mandibles through which liquid food is sucked. The larval state lasts for a number of years, which makes those species injurious to agriculture far more formidable than they might otherwise become.

Some beetles pupate in cocoons or cases, made of agglutinated bits of earth and wood. Those larvæ that bore in wood go into the pupa stage in their burrows. Some forms pupate in the ground, others on the surface of the ground; while still others, such as the ladybird, suspend themselves to objects above ground by the posterior ends of the body. Several pupate in the last larval skin. The pupal state of the majority of beetles lasts only two or three

BEETLES



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1 SPOTTED SEXTON BEETLE - NECROPHORUS GUTTATUS
2 SPLENDID LONG-HORN BEETLE - CALLICHROMA SPLENDIDA
3 STRIPED BUPRESTIS „ - BUPRESTIS STRIATA
4 APPLE-TREE BORER - SAPERDA CANDIDA
5 STAG BEETLE - LUCANUS ELEPHAS
6 NUTTALL'S BLISTER BEETLE - CANTHARIS NUTTALLI
7 GREEN AND SILVER „ - PHUSIOTUS GLORIOSA
8 GOLDEN TORTOISE „ - COPTOCYCLA BICOLOR
9 DUNG BEETLE - PHANAEUS CARNIFEX

ALL SOMEWHAT ENLARGED

weeks, but in some cases it lasts several years. On account of the hardness of the exoskeleton, beetles retain their shape well when dried, and hence collections of them are made with more ease than is possible in other departments of entomology, and adult beetles have been studied more than any other order of insects.

CLASSIFICATION. The enormous numbers of beetles do not adequately impress us, since beetles are less on the wing, and hence we see them less than flies, wasps, butterflies, or moths. The form and variation of the external parts are almost wholly used to determine their classification. The present number of described species is not far from 150,000, of which more than 11,000 species inhabit America north of Mexico, representing 83 families. The old subordinal divisions—Clavicornia, Serricornia, etc.—based on the shape of the antennæ, are no longer accepted as scientific, and in their place various subdivisions have been proposed. A commonly accepted classification is the following, based on the tarsi: (1) *Cryptotetramera*—4 joints in the tarsus, one rudimentary: Coccinellidæ and Endomychidæ. (2) *Cryptopentamera*—5 joints, one being abortive: Chrysomelidæ, Cerambycidæ (longicorns), Brenthidæ, Curculionidæ, etc. (3) *Heteromera*—four front tarsi five-jointed, hind tarsi four-jointed: Meloidæ, Stylopidæ, Tenebrionidæ, etc. (4) *Pentamera*—five-jointed: Ptinidæ, Cleridæ, Lampyridæ, Elateridæ, Buprestidæ (serricorns), Scarabæidæ (lamellicorns), Hydrophilidæ, etc., including about half of all known beetles.

Many of these, and other families, will be found described elsewhere, in their vocabulary places. See also English names of groups or species, as ROVE BEETLE; FIREFLY; BOMBARDIER BEETLE; STAG BEETLE, etc.

BIBLIOGRAPHY. For general works, see INSECTS. For the most recent and only complete classification of North American Coleoptera, consult: Le Conte and Horn, *A Classification of the Coleoptera of North America*, Smithsonian Institution (Washington, 1883); Leng and Beutenmüller published serially in the *Journal* of the New York Entomological Society for 1894-97 the early parts of a *Handbook of the Coleoptera of Northeastern America;* and Canadian beetles are covered by a long series of articles by F. H. Wickham in the *Canadian Entomologist* (London, Ontario, 1894-99). Most of the literature applies to single families, and will be found mentioned underneath the accounts of these given elsewhere.

BEE'TLESTONE'. A hard nodule of clay ironstone composed of shale. It is found at Newhaven, Wales. It is capable of taking a high polish, and is therefore used by lapidaries to make ornaments. The name beetlestone is from a fossil frequently found in the nucleus of the nodule; the fossil was formerly supposed to be a beetle, but is now known to be a coprylite.

BEET'LING (*beetle,* a heavy wooden mallet, from the root *beat*). A mechanical finishing process applied originally to linen shirting, and afterwards to cotton shirting, in imitation of linen, to give the cloth a hard and wiry look, by flattening the yarn irregularly in an angled manner. This is done by upright wooden stamps, placed close together in a row, with their square butts resting on a roller over which the cloth passes, doubled in a particular way, so that the yarn, when struck, acquires an angled appearance. Linen weft yarn for sail-cloth is likewise beetled by such a machine, or by hand-hammering on a large flat stone with a wooden mallet, to soften the yarn for easiness of working it in weaving. The yarn is also passed between longitudinally grooved rollers for the same purpose. Beetling is likewise a process in flax-dressing, to separate the woody from the flexible fibres of the plant. See LINEN.

BEET'-PULP'. A term applied to the mass of sliced sugar-beet remaining after the extraction of the sugar. It is a voluminous by-product of beet-sugar factories, and with the growth of the beet-sugar industry the means of utilizing it have received considerable attention. Beet-pulp is fed quite extensively to cattle and sheep, and in Europe has been successfully fed to milch cows. Large feeding-sheds are erected near the factories in some parts of the United States, several thousand head of steers and sheep being fed upon the beet-pulp, supplemented by hay and a little grain. The pulp contains about 90 per cent. of water, and in the wet condition must be fed at once or preserved in silos, which may be very crude. It would not pay for hauling any distance. In Europe it is dried at some factories, and then keeps well. See SUGAR.

BEET'-ROOT' SU'GAR. See SUGAR.

BEETS, bāts, NIKOLAAS (1814-1904). A Dutch poet and author, born at Haarlem. He became professor of theology at the University of Utrecht, but is principally known by his contributions to belles-lettres. His *Camera Obscura* (1839), which he published under the pseudonym of Hildebrand, has been called the finest piece of prose in the Dutch literature of the last century. It has been translated into several modern languages. His poetry, though inferior to his prose, enjoyed also great popularity. Among his poetic tales may be mentioned *Guy de Vlaming* (1853) and *Ada van Holland* (1846). His lyric songs include *Korenbloemen* (1853); *Nieuwe gedichten* (1857); and *Verstrooide gedichten* (1862). His poetry was published in four volumes (1873-81). He was also the author of some critical essays and several works on theology, among them *Stichtelijke uren* (1848-60).

BEETZ, bāts, WILHELM VON (1822-86). A German physicist, born at Berlin. He was at first professor of physics at the artillery school there. In 1856 he was appointed professor of physics at the University of Bern, and in 1859 at the University of Erlangen. He was called to the chair of physics at the Munich Polytechnikum in 1868. He made researches in regard to the electrical conductivity of liquids, galvanic polarization, and other problems; contributed extensively to *Poggendorff's Annalen*, and published *Leitfaden der Physik* (2d ed., 1857; 10th ed., 1890) and *Grundzüge der Electricitätslehre* (1878).

BEE'VILLE. A town and county-seat of Bee County, Tex., 90 miles southeast of San Antonio; on the San Antonio and Aransas Pass and the Texas and Pacific railroads (Map: Texas, F 5). It has a mild and equable climate, is in a region adapted to fruit and vegetable growing, and exports live stock, cotton, etc. Population, about 3000.

BEFANA, bā-fä′nȧ (It. *Befana*, or *Befania*, corrupted from *Epiphania*, Epiphany). The name given in Italy to a singular custom prevailing on the festival of that name (January 6). According to tradition, the Befana was an old woman who, being busy cleaning the house when the Three Wise Men of the East passed by on their way to offer their treasures to the infant Saviour, excused herself for not going out to see them, on the ground that she would have an opportunity of doing so when they returned. They, however, went home by another way; and the Befana, not knowing this, has ever since been watching for their return. She is supposed to take a great interest in children, who on Twelfth Night are put earlier to bed, and a stocking of each is hung before the fire. Shortly the cry "*Ecco la Befana!*" is raised; and the children, who have not gone to sleep, dart out of bed and seize their stockings, in which each finds a present bearing some proportion in value to his conduct during the year. If any one has been conspicuously ill behaved, he finds his stocking full of ashes—the method the Befana takes of expressing her disapprobation. It was also customary in Italy, on Twelfth Night, to carry an effigy called the Befana in procession through the streets amid great rejoicings; but this, which was probably the relic of the celebration of a Middle-Age 'mystery,' has fallen greatly into disuse. The word is also used to awe naughty children. See BEAN KING'S FESTIVAL.

BEFORE THE MAST. In rigged ships, that part of the upper deck forward of the mainmast used by the enlisted men. Abaft the mainmast the starboard side (in port; at sea, the weather side) of the quarter-deck is kept clear of all persons, except the officer of the deck and the captain; while the port side (at sea, the lee side) is used by the officers as a promenade, etc. This division of the ship at the mainmast gave rise to the expression *before the mast*, which is used in the same sense in the merchant service, where the customs are similar but less formal. Mariners serving before the mast are therefore enlisted men and not officers, both in the navy and in the merchant marine.

BEG. See BEY.

BEGA, bā′gȧ, CORNELIS (1620-64). A Dutch painter and etcher. He was born in Haarlem, and was a pupil of Adriaen van Ostade. Like his master, he chose his subjects from low life in its humorous aspects, especially tavern scenes. Among his numerous pictures the "Peasants' Concert," in the Amsterdam Museum; "The Alchemist," in the Cassel Gallery; "Peasant Family," in the Berlin Museum; and "Rustic Interior," in the Louvre, are considered his best.

BEGARELLI, bā′gȧ-rĕl′lē, ANTONIO (c.1498-1565). An Italian modeler and designer, known as Antonio of Modena, and accounted by his contemporaries the most eminent plastic artist of his time. He was born at Modena, and studied designing under Giovanni dell' Abbati and Guido Mazzoni, whom he speedily surpassed in his art. The greater part of his life was passed at Modena, but he practiced and taught at Parma and Mantua as well. He was a friend of Correggio, with whom he coöperated in the decoration of the cathedral at Parma, Begarelli supplying many of the designs and models for his friend's pictures. His groups were generally of life-size or heroic, and were lauded, according to Vasari, for their grace and exquisite proportion. Vasari also relates that Michelangelo once exclaimed of Begarelli's reliefs: "If this clay could become marble, alas for the ancient statues!" As a master of design Begarelli exerted a powerful influence on the succeeding schools of Lombard painters. Of his extant works the most important is a "Descent from the Cross," in the Church of San Francesco at Modena.

BEGAS, bā′gȧs, KARL (1794-1854). A German painter, born at Heinsberg, near Aix-la-Chapelle. After studying with Philippart he entered the studio of the painter Gros in Paris (1813). During the occupation of that city by the Allies in 1815, the King of Prussia became interested in the work of the young artist, and intrusted him with several important commissions. In 1821 he received a royal stipend, and proceeded to Italy, where he became an adherent of the 'Nazarenes,' or German Pre-Raphaelite School, from the principles of which, however, he afterwards departed. Among his principal works are: "Christ on the Mount of Olives" (1818, Garnisonkirche, Berlin); "The Coming of the Holy Ghost" (1821, Cathedral, ib.); "The Resurrection" (1827, Werdersche Kirche, Berlin); "Portrait of Thorwaldsen" (National Gallery, ib.); "Baptism of Christ" (Garnisonkirche, Potsdam); "Lorelei" (1834); "Mohrenwäsche" (1843, National Gallery, Berlin).

BEGAS, KARL (1845—). A German sculptor, a brother of Reinhold Begas. He received his education at the Berlin Academy of Art and in the studio of his brother. In Berlin he has achieved distinction as a sculptor of extremely graceful and charming groups, such as "Sister and Brother" (1878, National Gallery, Berlin). Noble in design also are the statues of Knobelsdorff (1886, Vestibule of the Berlin Museum), and of Columbus and of Aristotle (University of Kiel). The monument commemorating the Franco-Prussian War, unveiled at Cassel in 1898, and the two groups representing Margrave Otho IV. and Frederick William IV., in the "Siegesallee," of Berlin, were also executed by Begas.

BEGAS, OSKAR (1828-83). A German painter, eldest son of the elder Karl Begas. He was born in Berlin, and exhibited such precocity that the portraits executed by him at the age of twelve were prized as productions of high artistic merit. In 1852 he won a scholarship, which entitled him to a two-years course in Italy, where in 1853 he painted his picture entitled "The Hour of Gossip" (National Gallery, Berlin). After his return to Berlin he devoted himself chiefly to portraiture.

BEGAS, REINHOLD (1831—). A German sculptor, son of the elder Karl Begas. He was born in Berlin, and after studying with Wichmann and Rauch went to Rome, where the study of Michelangelo closely affected his future development. In 1866 he settled permanently in Berlin. Among the numerous and important works executed by Begas, the following are especially noteworthy: Statue of Friedrich Schiller (Berlin, 1863); "Venus Comforting Cupid" (1864); "The Rape of the Sabines" (1876); "Hermes and Psyche" (1878, National Academy, Berlin); "Borussia" (1885), a colossal statue, executed for the "Ruhmeshalle" (Hall of Fame) in Berlin; "Fountain of Neptune" (1891), a colossal bronze fountain, typifying the four principal streams of Prussia (Schlossplatz, Berlin); statue of Alexander von Humboldt (1882, Berlin); Sarcophagus of Emperor Frederick III., called 'Frederick the Noble' (1892, Potsdam Mausoleum); "Germania," a colossal equestrian statue surmounting the new Reichstag building; monument of Emperor William I. (1897, Berlin); statue of Prince Bismarck (Reichstag, Berlin). Begas has also executed a large number of busts, and has likewise displayed his remarkable versatility in a series of portraits of women and important architectural designs.

BEGG, James (1808-83). A Scottish Free Church leader. He was born at New Monkland, Lanarkshire. Educated in Glasgow University, he entered the ministry in 1829. At the disruption of the Scottish Church he joined the Free Church, and during the remainder of his life was minister of the Church of Newington, Edinburgh. He headed a contingent of Highlanders, who could be counted on to vote against any measure savoring in the least of liberalism in theology or practice. He died in Edinburgh. Among his works are: *A Handbook of Popery* (London, 1852); *Seat Rents Brought to the Test of the Scripture, Law, Reason, and Experience* (Edinburgh, 1838); *The Use of Organs and Other Instruments of Music in Christian Worship Indefensible* (Glasgow, 1866). Consult his *Life* by T. Smith (2 vols., Edinburgh, 1885-88).

BEG′GA, Saint. See Beguines.

BEG′GAR. See Mendicancy.

BEG′GAR-MY-NEIGH′BOR. A game at cards, usually played by two persons, between whom the cards are equally divided. Holding their cards with the backs upward, the players lay down a card alternately, until an honor is played, which is paid for by the adversary—four cards for an ace, three for a king, two for a queen, and one for a knave. When such payment is completed, the winner lifts the trick. But if an honor should be laid down during the payment, then the payment of the debt is stopped and transferred to the opposite party, who must pay for that in the same way; and so on, till a full payment is made without an honor. In the end, one party gets all the cards into his hands and wins the game.

BEGGAR OF BETH′NAL GREEN, The. The title of a comedy by James Sheridan Knowles (1834), founded on the old ballad, "The Beggar's Daughter of Bethnal Green."

BEG′GAR'S BUSH, The. The title of a once popular comedy by Fletcher, Rowley, and Massinger (1622). Its source was probably a novel by Cervantes, entitled *Fuerza de la sangre.* It has been laid under tribute in *The Royal Merchant* (1767) and *The Merchant of Bruges* (1815). The plot deals with the usurpation of a maiden's throne and her restoration to it by the aid of her lover, a prince disguised as a merchant.

BEGGAR'S LICE. See Hound's Tongue.

BEGGAR'S OP′ERA. See Gay, John.

BEGGAR TICK. See Bur Marigold.

BEG′GARWEED′ (so named either because it indicates poverty of soil or because it is so noxious a weed as to beggar the land). A name applied to a number of species of Desmodium which are considered valuable as forage plants or for enriching poor soils when plowed under. One of the best known is the Florida Beggarweed (*Desmodium molle* or *tortuosum*), which has no superior as forage produced upon light, sandy soils. It is an annual leguminous plant, growing 3 to 10 feet high, the height varying with the locality. When thinly grown, the stalks are liable to become woody; otherwise a large crop of forage of excellent quality may be obtained in from two to three months. Stock of all kinds seem to relish the hay, which has a high nutritive value. Yields of from 4 to 6 tons of hay per acre are reported from the Louisiana Experiment Station. Florida beggarweed does well as far north as Virginia, and it has been extensively introduced into the West Indies and elsewhere. A number of other species of Desmodium are widely distributed, some of which may prove valuable. They, in common with other leguminous plants, acquire large quantities of nitrogen from the air through the tubercles found upon their roots.

BEGON, be-gôN′, Michel (1638-1710). A French administrator and patron of science, born at Blois. He entered the French Navy, and rose to be Intendant of the West Indies, of Canada, and later of Rochefort and of La Rochelle. In recognition of the interest shown by him in the progress of science, the important genus of plants *Begonia* was named for him.

BEGO′NIA. A genus of the natural order Begoniaceæ, the species of which number about 350, and are found in the tropics of both hemispheres, being especially well represented in Mexico and Central and South America. Some of the species of Begonia are very popular house-plants, and are extensively grown under the names of Begonia, Elephant-Ears, Beefsteak Geranium, etc., for their handsome flowers and their odd-shaped and often beautiful foliage. The plants are perennial herbs, or, in some cases, shrubby at base, and have root systems of several kinds, upon which schemes of classification have been based. Some are tuberous, some have their stems continued into a rhizome, others have a cluster of scale-like bulbs, while still others have fibrous roots. Ordinarily the fibrous-rooted species are designated as winter-blooming, the others being summer-blooming, unless especially forced to the contrary. The leaves, which are radical, or, if borne upon the stem, alternate in two ranks, are usually unequal-sided, and vary within wide limits in size, outline, and texture. The flowers are monœcious, the male usually having four petals, the female five, sometimes two petals. The stamens are quite numerous; the styles two or four, with the stigmas twisted like corkscrews. The fruit consists of a winged capsule filled with numerous small seeds, which are without an endosperm.

Begonias may be propagated in a number of ways. Their tuberous or bulbous roots may be divided, their stems rooted, or they may be grown directly, either from leaves which are cut and placed in the soil, or from incisions made in the leaf, which lies flat upon the ground. The leaves form a callus where cut, from which ultimately arises a number of adventitious buds. Horticulturally, the begonias may be divided into the following sections: Fibrous-rooted or winter-flowering, semi-tuberous or Socotran, tuberous or summer-flowering, and rex or ornamental-leaved varieties. Many cultural varieties and hybrids of each are known to the florist, some of the hybrids being plants of great beauty, as the 'Gloire de Lorraine,' the double-flowered, and some of the single-flowered tuberous-rooted varieties, etc. The 'Rex Begonias' are of note on account of the remarkable coloration of the leaves in some varieties. They are originally of Asiatic origin, and have by crossing and selection yielded many fine forms. The Socotran species have peltate leaves, those of the others being all unequal-sided. The cultivation of begonias was begun about 1777, and there are now hundreds of named varieties of recognized merit. Of rather easy cultivation, they do not seem to withstand the burning summer sun and frequent droughts of the United States, and they grow better as house-plants than they do in the open. See Plate of GREENHOUSE PLANTS.

BEG-SHEHR, bĕg'shĕr', or **BEI-SHEHR** (named from the city on its shores; Turk. *beg*, bey + Pers. *Shehr*, dwelling). A fresh-water lake in latitude 37° 45′ N. and longitude 31° 30′ E., in the western part of the Province of Konieh, Asiatic Turkey, and supposed to be the ancient *Caralitis*. It is about 20 miles long, and from 5 to 10 miles broad, and is connected by a short stream of the same name with the Lake of Soghla.

BEGUINES, bâ-gēnz', **BEGUI'NÆ**, or **BEGUT'TÆ** (ME. *begyne*, *bygyn*, OF. *béguine*, Med. Lat. *beguina*, *beghina*, from Lambert le *Bègue*). The name of the earliest of all non-monastic societies of women united for pious purposes, dating from the Twelfth Century, and in all probability founded by Lambert le Bègue (died 1187), i.e. the stammerer, a priest of Liège, Belgium. The popular tradition of Brabant since the Seventeenth Century, that a Saint Begga, daughter of Pepin, and sister of Saint Gertrude, founded in 696 the first sisterhood of Beguines at Namur, has no historical basis. An account of their establishment at Vilvorde, near Brussels, is also demonstrably unauthentic. The Beguines were not restricted by vows, nor did they follow the rules of any order, but were united under a *supérieure* for the exercise of piety and benevolence, and lived generally in separate small cottages, which, collectively, formed the *beginagium*, or 'vineyard,' as it was Scripturally termed. Their establishments were often enriched by liberal donations. A church, a hospital, and a house of reception or common entertainment generally belonged to every community of Beguines. The sisters were distinguished from the rest of the laity only by their diligence and devotedness, piety, modesty, and zeal for the purity of youthful education. Societies of Beguines flourished greatly during the Twelfth and Thirteenth centuries, when they spread themselves over France and Germany. Among the most important were those in Hamburg, Lübeck, Ratisbon, Magdeburg, Leipzig, Goslar, Rochlitz, and Görlitz. As the pietists of the Middle Ages, the Beguines were often subjected to persecutions by the mendicant orders of friars; but, on account of their practical usefulness, were sheltered by the Pope and Councils, as well as by secular authorities. In the Thirteenth and Fourteenth centuries, the Beguines became united with the persecuted spiritualists among the Franciscans, and with the sect of the 'brethren and sisters of the free spirit.' Hence arose certain heresies, which, of course, occasioned interference on the part of the Inquisition; and on account of certain immoralities, a synod held at Fritzlar required that all candidates must be forty years old before they could enter a society of Beguines. These sisterhoods maintained their position in Germany and the Netherlands longer than in other countries. In Holland, they existed at the close of the Eighteenth Century, and in the present day we find here and there so-called Beguinen-häuser; two still exist at Amsterdam and Breda, in Germany; but they are now nothing more than almshouses for poor spinsters. In Belgium, at Ghent, there are two extensive Beguinages, Le Grand Beguinage de Saint Elizabeth and Le Petit Begynhoven; the former dates from 1234 and was transferred from near the Porte de Bruges to its present site in the northeast of the town in 1874. It contains about 600 sisters, besides 200 *locataires*, or occasional inmates. Their houses form a kind of distinct little town, which, though environed by a wall and a moat, is open to the visits of strangers. Le Petit Beguinage, in a different suburb, contains about 400 members and is also inclosed and has many separate houses. It is conducted similarly. Lace-making is one of the industries carried on. There are within the inclosure eighteen convents in which the younger sisters live; the older ones live in little houses containing two or four occupants. Living here a life of retirement and piety, the Beguines in their simple dark dresses go out as nurses to the hospital, and perform other acts of kindness among the poor. As above stated, they are under no monastic vow, but, having attached themselves to the sisterhood, it is their boast that none is known to have quitted it. Each one pays an entrance fee and yearly board. There are houses of Beguines also at Antwerp and Mechlin, and in 1854 one was established in France, at Castelnaudary, in the Department of Aude. Consult Baedeker, *Belgium and Holland*, under "Ghent" (Leipzig, 1897).

Similar societies of laymen appeared in Germany, the Netherlands, and the south of France in the beginning of the Thirteenth Century, and were known in Germany as *Beghards* (Ger. *begehren*, to seek with importunity), in France as *Beguines*, and in Italy as *bizachi* and *bocasoti*; but they never obtained the reputation enjoyed by the Beguine sisterhood. Toward the end of the Thirteenth Century they were commonly stigmatized as *bons garçons*, *boni pueri*, 'ministers' men,' 'bedesmen,' 'pietists,' 'vagabonds'—contemptuous titles, which expressed the low estimation in which they were held. On account of heretics of all sorts retreating into these half-spiritual communities, they were subjected to severe persecutions after 1367, and were gradually dispersed, or joined the orders of Dominicans and Franciscans. In the Netherlands, where they had preserved a better character than elsewhere, they maintained their ground longer, and were protected by Pope Innocent IV. (1245), in Brussels by Cardinal Hugo (1254), and in Liège by Pope Urban IV. (1261); but their communities disappeared in the Fourteenth Century. Consult: Mosheim, *De Beghardis et Beguinabus*

(Leipzig, 1790), and E. Hallmann, *Geschichte des Ursprungs der belgischen Beghinen* (1843).

BEGUM, bā′gŭm *or* bē′gŭm (Hind. *begam*, Pers. *baigīm*, lady, from Turk. *beg*, lord, prince + possibly Ar. *umm*, mother). A title bestowed upon sultanas and East Indian princesses.

BEHA-EDDIN, bā-hā′ ĕd-dēn′. See Bohaddin.

BEHAM, bă′hăm, or **BEHAIM,** bā′hīm, Barthel (1502-40). A German painter and engraver, born in Nuremberg. Although at first strongly influenced by Dürer, he afterwards conformed closely to the forms of the Italian Renaissance. His engravings, comprising about 90 plates, are considered especially fine. The following are a few of his principal paintings: "Palatine Otto Heinrich" (Augsburg Gallery, 1535); "Christ on Mount of Olives" (Berlin Museum); "Christ on the Cross" (Fürstenberg Gallery, Donaueschingen); three panels with portraits of King Ferdinand's children (Amsterdam Museum); "King Louis of Hungary" (Old Pinakothek, Munich); fifteen portraits of Bavarian princes (Schleissheim Gallery).—His brother, Hans Sebald Beham (c.1500-52), likewise renowned as a painter and engraver, was born in Nuremberg, whence, however, like his brother, he was banished because of his deistic and socialistic views. He afterwards lived at Munich and Frankfort-on-the-Main. In his engravings, he even excels his brother.

BEHAIM, bā′hīm, Martin (1459-1506). A famous German cosmographer. He was born in Nuremberg, of Bohemian descent, and probably received his scientific training from the famous savant Regiomontanus. Taking up a mercantile life, he traveled over Europe, visiting Venice, Mechlin, Antwerp, and Vienna, for purposes of trade, between 1475 and 1479. In 1480 he went to Portugal and began the business of making maps, in which he soon acquired fame and a competency. He was selected to accompany the Portuguese expedition commanded by Diogo Cam, on a voyage of discovery along the western coast of Africa, in 1484-85—an expedition which pushed nearly twenty degrees beyond the best previous exploration, as far as the mouth of the Congo River. In 1486 he visited Fayal, in the Azores, where there was a Flemish colony, and he shortly afterwards married the daughter of the governor of the islands of Fayal and Pico, Jobst von Hurter. He was a member of a commission to discover some practical method of determining a ship's position at sea by means of astronomical observations, and rendered important service in this connection to the science of navigation. In 1490 he went back to Nuremberg, where he lived till 1493. During this period he constructed a globe as a gift to his native city, where it is still preserved, being the oldest still in existence, and an invaluable record of the exact extent of geographical knowledge among the best-informed European scholars and travelers at the time Columbus started on the voyage in which America was discovered. After another short residence in Fayal, he removed to Lisbon, where he died, July 29, 1506. For his biography, consult: Murr, *Diplomatische Geschichte des Ritter Martin Behaim* (Gotha, 1801); and for more modern information, Nordenskjöld, *Facsimile-Atlas* (Stockholm, 1889).

BEHAR, be-här′ (Skt. *vihāra*, a Buddhist temple or convent). One of the provinces of Lower Bengal (q.v.), British India (Map: India, E 3). It is divided into the two commissionerships of Patna and Bhagalpur, which are again subdivided into 40 administrative districts. Area, 44,186 square miles. Population, in 1891, 24,393,000; in 1901, 24,185,000.

BE′HEMOTH (Heb. plur. of *Behemah*, beast; as often in Hebrew, the plural indicates a 'large beast,' the lord of beasts as it were, and not a plurality of animals). An animal mentioned in Job xl. 15-24. While it is evident from the description given of it—eating grass (15) yet being also in the water—that the author had in mind the hippopotamus, yet there is also no doubt that mythological notions are involved in the conception. It is grouped (Job xl. 25-31) with the leviathan (q.v.), and recent investigation has made it probable that behemoth and leviathan represent two of the primeval monsters who, according to Babylonian traditions which became current among the Hebrews, were depicted as in control of the universe before the gods established order. The monsters, of which, in the Babylonian cosmogonical myths, there are no fewer than eleven, symbolize the primeval chaos. Egyptian notions of 'supernatural' hippopotamuses and crocodiles, which are representatives of the evil god Sit, may also have contributed toward the biblical conception of behemoth and leviathan. Consult Gunkel, *Schöpfung und Chaos* (Göttingen, 1895).

BEHISTUN, bā′hĭs-tōōn′ (Ar., Pers. *bagh*, garden + Pers. *stan*, district, region; *Bisutoun*, *Bisutun* of the old Persian inscriptions). A ruined town of the Persian Province of Irak-Ajemi, 21 miles east of Kermanshah. Diodorus Siculus (II., 13) says that Queen Semiramis, on a journey from Babylon to Ecbatana, encamped here, and had her likeness and the likenesses of a hundred of her guard cut into the rock of the mountain that rises at this place. This tradition refers to a most remarkable inscription found at the limestone mountain at Behistun, which possesses great historical value. The mountain rises to a height of 1700 feet, and the inscription is found at a height of 300 feet, in a position such that it must have been engraved with the aid of scaffolding. Although observed by several travelers, it was not until 1835 that it was copied by Sir Henry Rawlinson, after infinite trouble and at great expense. The inscription was made by Darius I. (c.518 B.C.), and contains an account of his genealogy and his triumphs. It is in cuneiform characters, and trilingual, being written in Assyrian, in Persian, and in Median. Accompanying the text, there is an elaborate series of sculptures, representing Darius receiving nine pretenders to the throne, who stand before him with chains about their necks. The inscription was cut into the rock with the utmost care, and was preserved by a varnish harder than the rock itself. After copying the inscription, Rawlinson spent many years in the task of decipherment. He published the Persian text in 1846, in the publications of the Royal Asiatic Society, and this publication, with Rawlinson's translation of the inscription, was a most important contribution to the solution of the mystery of Persian cuneiform. This accomplished, he and others, notably Westergaard and Norris, set themselves to work on the Assyrian text, and by 1852 the foundations were laid for the reading of the cuneiform inscriptions meanwhile found in Mesopotamia. (See ASSYRIA.) The Median text was first published by Edwin Norris (London, 1853), and later by Appert, *Le peuple et la langue des Mèdes* (Paris, 1879). For the best publication and translation of the Persian text consult: Spiegel, *Die persischen Keilinschriften* (2d ed., Leipzig, 1881); of the Assyrian text, Bezold, *Achämeniden Inschriften* (Leipzig, 1882); and of the Median text, Weisbach, *Die Achämenideninschriften Zweiter Art* (Leipzig, 1890).

BEHM, bām, ERNST (1830-84). A German geographer and statistician. In 1856 he became assistant editor of the geographical periodical *Petermanns Mitteilungen*, and on the death of Petermann, in 1878, succeeded him as chief editor. In 1866 he founded the *Geographisches Jahrbuch*, from which was detached in 1872 the *Bevölkerung der Erde* as a statistical supplement to the *Mitteilungen*. From 1876 he took charge of the statistical department of the *Almanach de Gotha*. His writings are marked by fullness, accuracy, and lucidity of arrangement.

BEHN, bĕn, AFRA, or APHRA (1640-89). An English novelist and playwright. She was born at Wye, in Kent, the daughter of John Johnson, a barber. When a child she sailed to Surinam, South America, with the Lieutenant-Governor, whom she was accustomed to speak of as her father. He died on the passage out, but the family continued the voyage, and remained in Surinam for some time. Here the young girl made the acquaintance of the celebrated slave Oroonoko, who afterwards became the subject of one of her novels, and of a tragedy by Southerne. Returning to England, she married a merchant of Dutch extraction named Behn, was presented at Court, where her personal appearance and vivacious freedom of manners pleased the King, who deputed her to watch events in Flanders. She accordingly went to Antwerp, where she succeeded in discovering the intention of the Dutch to sail up the Thames and Medway, and communicated the secret to the English Court, which, however, took no notice of the information—a slight that caused Mrs. Behn to throw up State politics in disgust. On her return to England she was associated with all the profligate wits, as well as the more staid scholars and poets of the time, and devoted herself to literature. Her numerous plays, poems, tales, and letters are disfigured by general impurity of tone and indecency of language; and, in point of intellectual ability, none of her works deserve the high praise lavished on them by Dryden, Cotton, Southerne, and others. Of them all, *Oroonoko* is worth perusal. Interesting in itself, it also holds a place in the progress of English fiction, as it shows, at a time when extravagant romances were the fashion, a tendency to realistic effort. Mrs. Behn was buried in Westminster Abbey. Consult her *Works* (London, 1871), and *Anglia* for January, 1902.

BEHR, bār, WILHELM JOSEPH (1775-1851). A German publicist, born at Sulzheim. He studied at Würzburg and Göttingen, and from 1799 to 1821 was professor of constitutional law at the University of Würzburg. He subsequently was chosen mayor of Würzburg; but when elected deputy to the Diet, in 1834, the royal sanction of his election was refused. On account of his freely expressed political opinions, he was convicted of *lèse-majesté* and participation in political machinations, and only with the amnesty of 1848 regained his complete freedom. In the same year he was elected to the German National Assembly. He published *System der Staatskunst* (Frankfort, 1810); *Verfassung und Verwaltung des Staats* (Nuremberg, 1811-12); *Bedürfnisse und Wünsche der Bayern* (Stuttgart, 1830); and other works.

BEHRAM, bĕ'răm, or **BEKHRAM**, bĕk'-răm. See ASSUS.

BEHRENDS, bā'rens, ADOLPHUS JULIUS FREDERICK (1839-1900). An American Congregational clergyman. He was born at Nimeguen, Holland, emigrated to New Orleans with his parents in 1845, taught school and learned the trade of cabinet-maker, and studied at Denison University and the Rochester Theological Seminary, where he was graduated in 1865. He was pastor of Baptist churches at Yonkers, N. Y., and Cleveland, Ohio, but joined the Congregationalists in 1876, and spent seven years as pastor of the Union Congregational Church of Providence, R. I. In 1883 he became pastor of the Central Congregational Church in Brooklyn, N. Y., where he remained until his death. A forcible thinker and a careful scholar, and of pleasing yet impressive personality, he stood in the foremost rank of American pulpit orators. Among his published works are to be found: *Socialism and Christianity* (1886); *The Philosophy of Preaching* (1890); *The Old Testament Under Fire;* and *The World for Christ.*

BEHRENS, bā'rens, BERTHA (1850—). A German novelist, whose pseudonym is W. Heimburg. She was born at Thale, and educated at Quedlinburg. She was, in a sense, the successor of Marlitt in the *Gartenlaube*, in which periodical most of her novels appeared. Among them may be mentioned: *Aus dem Leben meiner alten Freundin* (Magdeburg, 1878; 8th ed., Leipzig, 1890); *Lumpenmüllers Lieschen* (1879); *Ihr einziger Bruder* (1882); *Waldblumen* (1882); *Dazumal*, 8 stories (1887); *Trudchens Heirat* (1884); *Um fremde Schuld* (1895); *Antons Erben* (1898). She also completed *Das Eulenhaus*, a posthumous novel, by Marlitt. A complete illustrated edition of her works appeared at Leipzig in 1893 (latest edition, 1898).

BEHRING, bā'rĭng or bē'rĭng. See BERING.

BEHRING, bā'rĭng, EMIL ADOLF (1854—). A German physician. He was born at Hansdorf, Prussia, studied medicine in Berlin, in 1880 became an army surgeon, and in 1894 was appointed a professor at the University of Halle. In 1895 he was called to become director of the Hygienic Institute at Marburg. He was the discoverer of diphtheria serum, and attained a great reputation by that means and by his contributions to the study of immunity. Among his publications are *Die Blutserumtherapie* (1892) and *Bekämpfung der Infektionskrankheiten* (1894).

BEHRISCH, bā'rĭsh, ERNST WOLFGANG (1738-1809). A friend of Goethe. He was born near Dresden, and while acting as a private tutor at Leipzig became acquainted with Goethe. Upon his departure from Leipzig in 1767 he was made the subject of three odes by Goethe, who also subsequently referred to him in most friendly terms in *Dichtung und Wahrheit*, and in his talks with Eckermann. A number of Goethe's letters to him are to be found in Vol. VII. of the *Goethe-Jahrbuch* (Frankfort, 1886). For his biography, consult Hosäus (Dessau, 1883).

BEIJEREN, bī′ẽr-en, or **BEYEREN**, Abraham van (c.1620—). A Dutch painter of still-life. He was born at The Hague, where he was master of the guild in 1640. Many of his works, which are considered among the finest specimens of their kind, are preserved at the museums of Amsterdam, Rotterdam, Frankfort, Berlin, Lille, Vienna, and Budapest; at the Dresden, Hanover, and Schwerin galleries, and at the Hermitage, Saint Petersburg.

BEIJERLAND, bī′ẽr-länt. An island of the Province of South Holland, Netherlands, situated at the mouth of the Maas or Meuse, south of the Island of Ijsselmonde. It is very fertile, produces large quantities of flax, and is named after Sabina of Bavaria, whose husband, the Count of Egmont, began the construction of the island's dikes in 1557. Population, 13,300.

BEILAN, bȧ-län′. A small town of Syria, situated a few miles from Alexandretta (q.v.), near the Beilan Pass, which separates the mountain ranges of Amanus and Rhesus, and is supposed to be the *Pylæ Syriæ* (Syrian Gates) of antiquity, probably used by Alexander and the Crusaders (Map: Turkey in Asia, G 4). The town has a good climate and an excellent water-supply, and is used as a summer resort by the European colony of Alexandretta. Its population is about 5000.

BEILSTEIN, bīl′stīn, Friedrich Konrad (1838—). A Russian chemist, born in Saint Petersburg. He studied chemistry in Heidelberg, Göttingen, Munich, and Paris, and in 1860 became Wöhler's assistant at Göttingen. In 1866 he was made professor of chemistry at the Institute of Technology in Saint Petersburg. He has carried out a number of original investigations in organic and analytical chemistry, and wrote *Anleitung zur qualitativen chemischen Analyse* (Leipzig, 1867; several German editions of this work and translations into other European languages have been published); and *Die chemische Grossindustrie auf der Weltausstellung in Wien 1873* (Leipzig, 1873). Beilstein's *Handbuch der organischen Chemie* (1st ed., Hamburg, 1880-83) is indispensable to the chemical investigator, and is well known to every student of organic chemistry. A third edition of this voluminous work was begun in 1893, and in 1901 a supplementary volume, edited by Paul Jacobson, was published by the German Chemical Society.

BEIRA, bā′rȧ (Port., shore, strand, bank, from Gael. *bior*, water). A province of Portugal, bounded by Spain and the Atlantic on the east and west, respectively, the river Douro on the north, and the provinces of Alemtejo and Estremadura on the south (Map: Portugal, B 2). Area, 9248 square miles. The coast land is flat, but the elevation gradually rises from the northern frontier, the interior being traversed by a number of mountain chains, not exceeding 7000 feet in their highest summits. The province is drained by a number of small rivers, mostly tributaries of the Douro, and contains many mineral springs. The soil is mostly stony with the exception of the coast land. Agriculture, stock-raising, and fishing are the chief industries, while manufactures are unimportant. The transportation facilities are inadequate, and the commerce is insignificant. For administrative purposes Beira is divided into the five districts of Aveiro, Viseu, Coimbra, Guarda, and Castello Branco. Population, in 1890, 1,450,441; in 1900, 1,518,406.

BEIRAM, bā′räm. A Turkish word designating the two great Mohammedan festivals: (1) The Lesser Beiram, held for from one to three days at the end of the fasting month, Ramadan. (2) The Greater Beiram, held for four days, seventy days later.

BEIRUT, bā′ro͞ot *or* bȧ-ro͞ot′, or **BEYRUT** (anciently, *Berytus*, Gk. Βηρυτός, *Bērytos*, the city of wells, from Heb., Ar. *beer*, *bir*, well). Capital of the vilayet of the same name in Syria, Asiatic Turkey, and the chief seaport of Syria (Map: Turkey in Asia, F 6). It is situated on the western coast, on the slopes of the Ras Beirut and Saint Dimitri, about 90 miles by rail northwest of Damascus. It consists of the old town, which is ill-built and unattractive, and a number of suburbs, with fine streets and houses and many features of a modern city. The climate is moderate and healthful, and with its good water-supply Beirut is regarded as one of the most healthful places of Asiatic Turkey. In its numerous business houses, European schools, and churches, Beirut shows the effect of European influences, while its Oriental characteristics are becoming less perceptible. There are 23 mosques and 38 Christian churches of different denominations, the chief mosque being a former church built by the Crusaders. Beirut has numerous educational institutions, maintained chiefly by missions, among which the French are the most influential, their language being almost exclusively that of the Christian population. The city contains also the Syrian Protestant College (American).

The industrial and commercial growth of Beirut has been more rapid than that of any other city of Asiatic Turkey. Silk and cotton fabrics, as well as gold and silver articles, are the chief manufactures. The region around Beirut yields large quantities of silk, cotton, and tobacco for export, while the chief imports are foodstuffs and articles of apparel. The total value of the imports aggregates about $7,000,000 annually, as against $3,600,000 of exports. The harbor of Beirut is deficient both in size and in depth, and heavier vessels are compelled to anchor outside. Regular steam communication is maintained with Great Britain, Austria-Hungary, and a few other European countries, while the coastwise transportation is effected chiefly by Turkish sailing vessels. Beirut is the seat of a pasha, a Greek bishop, a Maronite archbishop, and a Papal delegate. The United States has a consular representative. The population is estimated at 120,000, of which only about 30 per cent. is Mohammedan. The number of Europeans is about 4300.

Beirut, mentioned in Egyptian inscriptions as early as the Fifteenth Century B.C., is the Berothai of the Bible and the Berytus of the classical writers. Under the Roman emperors it was the seat of a celebrated school of law. It was besieged and captured by Baldwin I., King of Jerusalem, in 1110. In 1840 it was bombarded and taken by the English fleet, under Sir C Napier.

BEISA, bī'sȧ. A large antelope of Abyssinia (*Oryx beisa*), allied to the gemsbok, but lacking the tuft of hair on the throat. See GEMSBOK; ORYX; and Plate of ANTELOPES.

BEISSEL, bī'sel, JOHANN CONRAD (1690-1768). A German mystic, prominent as the founder of the sect of "Seventh-Day Dunkers," and of the Ephrata Community. He was born at Eberbach in the Palatinate, and learned the trade of a baker. He also studied music and became a competent violinist. After he had taken a course in theology at Halle he was banished (in 1720) for holding Pietistic and Inspirational views, emigrated to America, and with a few friends settled in Germantown, Pa. In the following year he became a hermit at Mill Creek, Lancaster County, Pa., where he remained until 1724, when he returned to Germantown, and was there baptized as a Dunker. He soon began to preach doctrines distasteful to the Dunkers, especially with regard to celibacy and the observance of Saturday as Sabbath, and in May, 1725, founded the sect of Seventh-Day Dunkers. He again became a hermit in 1732, this time on the river Cocalico; but his adherents followed him to his retreat, and in 1735 he founded the "Order of the Solitary," and established the celebrated settlement at Ephrata, Pa. (q.v.), at whose head he remained until his death. Here he put into practice many of his socialistic, communistic, and religious theories.

He published various collections of hymns, including *The Voice of the Lonely and Forsaken Turtle Dove—that is, of the Christian Church; by a Peaceable Pilgrim Traveling to Tranquil Eternity* (1747); and *Paradisiacal Wonder-Play* (1766), which contains the sect's quaint "Brother Song" of 215 stanzas, and its "Sister Song" of 250 stanzas. He was also the author of the first volume of German poetry published in America, *Göttliche Liebes- und Lobestöne* (Philadelphia, 1730). By his fellow-religionists he was known as "Friedsam," and the inscription on his tombstone at Ephrata reads: "Here rests an outgrowth of the love of God, 'Friedsam,' a Solitary Brother, afterwards a leader, ruler, teacher of the Solitary and the Congregation of Christ in and around Ephrata." For a partial account of his life, consult the curious *Chronicon Ephratense* (Ephrata, 1786).

BEIT, bāt. An Arabic word signifying house, abode, or place, the equivalent of which in Hebrew is *beth*. Thus, in Arabic we have *beit-al-harâm*, the house of the sanctuary, or the sacred house, the name of the central sanctuary at Mecca; and in Hebrew *Beth-el*, house of God, *Beth-abara*, place of fords, etc.

BEIT-EL-FAKIH, bāt'el-fä'kē (Ar. *beit*, house + *el*, the + *faqîh*, teacher, schoolmaster). A fortified town of Asiatic Turkey, in the Vilayet of Hodeida, formerly Yemen, situated about 19 miles from the Red Sea. It was formerly the chief centre of the coffee trade in Asia, and still exports about 12,000,000 pounds annually. Population about 8000.

BEITULLAH, bāt'ụl'lȧ (Ar. *beit*, house + *Allah*, God). The spacious building or temple at Mecca which contains the Kaaba. See MECCA; and KAABA.

BEITZKE, bīts'ke, HEINRICH LUDWIG (1798-1867). A German politician and historian, born at Muttrin (Pomerania). He served as a volunteer in the campaign of 1815, studied at the military schools of Coblenz and Mainz, entered the army as an officer in 1817, and retired in 1845 with the rank of major. In 1858 he was elected to the Prussian Chamber of Deputies. He published *Geschichte der deutschen Freiheitskriege in den Jahren 1813 und 1814* (1855)—an accurate and unprejudiced narrative, widely read; *Geschichte des russischen Kriegs im Jahre 1812* (1856); *Geschichte des Jahres 1815* (1865), and some other less important works.

BEJA, bā'zhȧ (the *Pax Julia* of the ancients). A town and seat of a bishopric in the Province of Alemtejo, Portugal, 36 miles south of Evora (Map: Portugal, B 3). It contains an interesting mediæval castle, a cathedral, the notable Church of Our Lady of the Conception, the remains of ancient fortifications, and a Roman aqueduct. Two fairs are held here annually. The city has a considerable trade in the cattle and agricultural products of the fertile region adjacent, and there are also tanneries and potteries. Population, in 1890, 8394; in 1900, 8895.

BE'JAN, or **BA'JAN** (Med. Lat. *bejanus*, Fr. *bejaune*, *bec jaune*, yellow beak, i.e. unfledged bird, sometimes *beanus*; cf. Ger. *Gelbschnabel*). A name applied to freshmen in mediæval universities, and still surviving in Scotland. Bejaunia, or payment for 'first footing' by students on entering the university, was general in the Middle Ages, and was a part of a kind of initiative ceremony which included much horse-play, ending with a banquet. Often there was elected a mock 'abbot' of the Bejauni. These practices led to so much abuse that they were frequently a subject of university statutes, which, however, tended rather to regulation than to suppression of this form of hazing. For an account of the ceremonies consult Rashdall, *Universities of Europe in the Middle Ages* (Oxford, 1895).

BEJAPORE, bē'jȧ-pōr'. See BIJAPUR.

BÉJAR, bā'ʜär. An old town of Spain, in the Province of Salamanca, about 45 miles south of the capital of the province (Map: Spain, C 2). It is situated on the river Cuerpo de Hombre, on a plateau 3165 feet above sea-level. There are extensive cloth manufactures and tanneries, and a considerable trade in wool. Béjar gives its title to a ducal family, whose ancestral palace within its walls, and the churches of San Juan, Santa María, and El Salvador, are the most pretentious buildings. There are warm sulphur springs in the vicinity.

BEJART, bȧ'zhär'. A family of French comedians of the end of the Seventeenth Century. They formed part of Molière's troupe. One of them, Armande, was married to Molière in 1662, and imbittered his last years by her coquetries. See MOLIÈRE.

BEJAS, bā'jȧs. Hamitic peoples between the Nile, the Red Sea, Abyssinia, and Upper Egypt. They are tall (1.708 m.) and muscular, with black, almost woolly hair. Keane subdivides them into Ababdeh, Bishari, and Taga. See AFRICA.

BEKAA, bĕk'ȧ-ä, El (Heb., Ar., large valley). The Cœle-Syria of the ancients, the 'plain of Lebanon' of the Old Testament. A beautiful and fertile elevated valley of Syria, situated between the nearly parallel ranges of the Lebanon and the Anti-Lebanon mountains, and watered by the Leontes (Litany). It occupies an area about 90 miles long, has a greatest width of 20 miles, and is much used for a grazing-ground by the Arabs, the banks of the watercourses being very fertile. The name of Cœle-Syria was once applied to the entire southern portion of Syria, embracing Phœnicia and Palestine.

BEKE, bēk, Charles Tilstone (1800-74). An English traveler, born at Stepney, Middlesex. He first studied law at Lincoln's Inn, and devoted much attention to ancient history, philology, and ethnography. The results of these studies first appeared in his works, *Origines Biblicæ, Researches in Primeval History* (1834). Supported only by private individuals, he joined in Abyssinia the party led by Major Harris, and distinguished himself by the exploration of Gojam and the countries lying to the south, which were previously almost unknown in Europe. The results of these researches appeared partly in several journals, and in *Abyssinia: A Statement of Facts*, etc. (2d ed., London, 1846). After returning to Europe, he published the *Essay on the Nile and Its Tributaries* (London, 1847); *On the Sources of the Nile* (1849); *Mémoire justificatif en réhabilitation des pères Paez et Lobo* (1848); and *On the Geographical Distribution of the Languages of Abyssinia* (1849). In 1861 he made a journey to Harrar, and undertook in 1865 a fruitless mission to Abyssinia to obtain the release of British captives. In 1874 Dr. Beke started for the region at the head of the Red Sea, where he claimed (though his views are disputed) to have discovered Mount Sinai east of the Gulf of Akabah, and not west, as generally supposed. Other works of his are: *British Captives in Abyssinia* (1865); *King Theodore* (1869); *Idol in Horeb* (1871); *Jesus, the Messiah* (1872); and *Discoveries of Sinai in Arabia*, which appeared posthumously in 1878.

BÉKÉS, bā′kāsh. A town in Hungary, capital of a county of the same name, at the confluence of the Black and White Körös, about 45 miles southwest of Grosswardein (Map: Hungary, G 3). It is entirely agricultural in character. Wheat, flax, and vegetables are raised, and considerable prominence is given to agriculture. Population, in 1890, 25,000, mostly Protestant Hungarians.

BEKKER, bĕk′kẽr, Elisabeth (1738-1804). A Dutch author, born at Vliessingen. During the Revolutionary period she lived in France, where she narrowly escaped death by the guillotine. She wrote some poems and a number of stories, marked by elegance of style and by skillful character delineation. These latter include *Historie van Willem Levend* (1785) and *Abraham Blankaart* (1787).

BEKKER, Immanuel (1785-1871). A German classical scholar, born in Berlin. He studied at Halle under F. A. Wolf (q.v.), taking his degree in 1807; in 1811 he was appointed professor of philology at Berlin, where he continued until his death in 1871. Bekker's great service to classical philology consisted in his recensions of texts on the basis of new collations of manuscripts, independent of printed editions. His industry was enormous, and he carried on his researches in Germany, France, Italy, and England, examining in all over 400 manuscripts. Among the authors included in his recensions were Plato (for whose text he collated over 30 manuscripts), Aristotle, the Attic orators, Aristophanes, Thucydides, Theognis, Sextus Empiricus, Livy, Tacitus, and others. He was also engaged on the *Corpus Inscriptionum Græcarum*, edited 25 volumes of the *Corpus Scriptorum Byzantinorum*, and published *Anecdota Græca*, 3 vols. (Berlin, 1814-21), as well as *Studies in Old French*.

BÉL, bāl, Karl Andreas (1717-82). A Hungarian historian, son of Matthias Bél. He was born at Pressburg, and studied at Altdorf, Jena, and Strassburg. In 1757 he became professor of poetry at Leipzig, where he edited the *Acta Eruditorum* and the *Leipziger Gelehrte Zeitung*. He was subject to melancholia, and committed suicide during one of his periods of depression. He wrote *De Vera Origine et Epocha Hunnorum, Avarum, Hungarorum in Pannonia* (1757); *De Maria Hungariæ non Rege sed Regina* (1744).

BÉL, Matthias (1684-1749). A Hungarian historian and savant, born at Ocsova. He studied at Halle, was pastor at Neusohl and rector of the Evangelical Lyceum at Pressburg from 1719. He wrote *Hungariæ Antiquæ et Novæ Prodromus* (Nuremberg, 1723); *Notitia Hungariæ Novæ Historico-Geographica* (incomplete, 1735-42), and other works, which have proved rich sources of material for subsequent historical workers.

BÉLA, bā′lŏ. The name of four Hungarian kings of the dynasty of Arpád. Béla I. (1061-63) suppressed the last attempts to restore heathenism. By fixing a standard of weights, measures, and coinage, he gave a permanent stimulus to the commerce of Hungary. He was also the first to introduce the representative system into the Diet. —Béla II. (1131-41), surnamed 'The Blind,' was greatly influenced by his bloodthirsty wife. At the time of his marriage there was a general slaughter of the advisers in the preceding reign. He managed, however, to live on good terms with the Greek and the German emperors. His death was due to intemperance.—Béla III. (1173-96), grandson of Béla II., was educated at Constantinople, and showed a predilection for Byzantine customs and culture, which he introduced into Hungary. He greatly increased the number of religious houses. He married the sister of Philip Augustus of France.—Béla IV. (1235-70) was the son of Andrew II., who granted the Golden Bull (q.v.). His great object was the humiliation of the nobles and the restoration of the royal power. His opponents appealed to Frederick II., Duke of Austria; but Béla, in 1236, overcame Frederick and forced him to pay tribute. Not long after, Béla was compelled to seek refuge with his discomfited foe from the Mongols, who in 1241 defeated him on the Sajó. Frederick robbed the King of all the treasure he had saved, and extorted from him three counties. Béla remained in Austria until the Mongols withdrew, and then returned, making it his especial care to rebuild the ruined villages and to encourage colonization in the devastated parts. He was so successful in recruiting his strength that he vanquished Frederick at Vienna and repelled a second Mongolian invasion. He was unsuccessful in war against Ottocar II. of Bohemia, who defeated him in 1260.

BELAIR, be-lâr′. A town and county-seat of Harford County, Md., 21 miles northeast of Baltimore; on the Maryland and Pennsylvania Railroad (Map: Maryland, M 2). It is the commercial centre of a fertile agricultural region, and has some manufactures. Population, in 1890, 1416; in 1900, 961.

BELA′RIUS. In Shakespeare's *Cymbeline*, an exiled nobleman, who in revenge steals the sons of Cymbeline. Having rescued Cymbeline when he was taken prisoner, Belarius becomes reconciled, and the two young princes are restored to their father.

BEL AND THE DRAG′ON. The title of one of the books of the Old Testament Apocrypha, part of the Greek (Septuagint) and Latin (Vulgate) translations of the Bible, and so accepted as canonical by many of the early Christian writers and by the present Church of Rome. The original language is likely to have been Aramaic. The book is professedly an addition to the Book of Daniel, and is designed still further to exalt that hero. It contains two stories, which in general are these, though there are variations: (1) That Daniel convinced the King of Babylon of the fraud practiced upon him by the priests of Bel, who pretended that the god ate at night the feasts regularly set in his temple, by having the floor of the temple covered with fine ashes, unknown to the priests. These came at night as usual, through a secret door, and removed the food, but by morning light their footprints were discovered on the floor. The King in his rage drove away the priests and destroyed the idol of Bel. (2) Daniel killed a dragon that was worshiped by the Babylonians by forcing it to swallow a mixture of pitch, fat, and hair, with the result that it burst. The people in their rage compelled the King to cast Daniel into the lions' den. Thither Habakkuk, the prophet, was carried from his home in Judea with food for Daniel. The King, on finding Daniel still alive on the sixth day, ordered his release and the punishment of his accusers.

BELAS′CO, David (1862—). An American playwright. He was born in San Francisco, where he spent most of his boyhood, and began in 1874 as an actor at the Metropolitan Theatre. Showing talent, however, in the adaptation of plays for the local stage, he soon found a wider field. One of his early successes was *Hearts of Oak*, in which he toured with James A. Hearne. He was for a time stage manager of the Madison Square Theatre, New York City, and afterwards was connected with the Lyceum Theatre. While there he wrote, in collaboration with Henry C. De Mille, *The Wife* and *The Charity Ball*, and also, for E. H. Sothern, *Lord Chumley*. In January, 1893, *The Girl I Left Behind Me*, which he wrote with Franklin Fyles, was produced at the Empire Theatre, and had great success. In 1895 came *The Heart of Maryland*, a melodrama of the Civil War. Among his other plays are *Zaza*, *May Blossom*, *Men and Women*, *La Belle Russe*, *Valérie*, and *Du Barry*, the last suggested at least by Jean Richepin's play of the same name. Of his recent productions, a farce called *Naughty Anthony* (Washington, D. C., December 25, 1899) and a dramatization of John Luther Long's *Madame Butterfly* (Herald Square Theatre, March 5, 1900) have been in a somewhat new vein, and were notably well received.

BELAY′ (probably from Dutch *beleggen*, nautical term of same meaning). A term which signifies to *stop*. A rope is *belayed* by winding it around a cleat, cavil, bitt, or belaying-pin. To prevent the turns from unwinding they are usually put on in figure-of-eight fashion, one loop around one end of the cleat or pin, the other around the other end.

Belaying-Cavils are large wooden belaying-pins, of rectangular section, but with rounded corners, built permanently into pin-rails or fife-rails. They are intended for ropes too large to be conveniently belayed on pins of the ordinary type, or as friction-pins around which large ropes are taken when lowering heavy weights.

Belaying-Cleat. A piece of wood or metal bolted to some part of the structure of a ship for the purpose of belaying ropes. The cleat has two horns around which rope is belayed as about a belaying-pin; the section of an ordinary cleat is not unlike a letter H, one side of which is bolted to the ship's structure, leaving the other free for belaying purposes.

Belaying-Pin. A short bar of iron, brass, or wood used for the belaying of ropes. The pin varies in length from 10 to 18 inches, and in diameter from three-quarters of an inch to an inch and a half. The pins are put through holes in wooden rails, called pin-rails, or fife-rails, according as they are out at the side of the ship, or inboard, and partly surrounding a mast; and they are prevented from falling out of the rail by a shoulder a little above the middle of their length.

BELBEIS, bĕl-bās′. An Egyptian town situated about 30 miles northeast of Cairo (Map: Egypt, E 2). It is on the caravan route to Syria, and on the railway line connecting Suez with Cairo. Its population is about 8000. In the vicinity of Belbeis are the ruins of Bubastis (q.v.).

BELCH, Sir Toby. A rollicking character in Shakespeare's comedy, *Twelfth Night*, who, with Sir Andrew Aguecheek, the clown, and Maria, lead Malvolio, the steward, to believe that the Lady Olivia is in love with him.

BELCH′ER, Sir Edward (1799-1877). An English admiral. He entered the navy in 1812, and in 1816 took part in the bombardment of Algiers. In 1825 he accompanied Captain Beechey on his expedition to Bering's Strait, and in 1829 he was raised to the rank of commander. In 1836 he was appointed to the command of the *Sulphur*, and for three years was employed in surveying the west coast of America. Returning by the western route, he rendered important services in the Canton River to Lord Gough, whose successes over the Chinese were greatly due to Belcher's soundings and reconnaissances. On his return he published a narrative of the voyage, and in 1843 was made a post-captain, and knighted. In 1852 he was appointed to the command of an expedition sent out by the Government to search for Sir John Franklin. He published *The Last of the Arctic Voyages* (1855); *Narrative of a Voyage to the East Indies in 1843-48;* and other works. In 1861 he became rear-admiral of the red, in 1866 vice-admiral, in 1867 K.C.B., and in 1872 rear-admiral.

BELCHER, Jonathan (1681-1757). A colonial Governor of Massachusetts and New Hampshire, and afterwards of New Jersey. He was born in Cambridge, Mass., graduated at Harvard in 1699, and afterwards spent six years in Europe. In 1730 he was appointed Governor of Massachusetts and New Hampshire; but he soon became embroiled in disputes with the colonial legislatures concerning the payments of the Governor's salary, questions of colonial currency, and the protracted boundary dispute between Massachusetts and New Hampshire, and in 1741 was removed, in deference to the popular outcry against him. He has passed into history as perhaps the most unpopular of all the royal Governors of Massachusetts. Some time after his removal he again visited England, where he succeeded in restoring himself to favor, and in 1747 he was appointed to succeed Morris as Governor of New Jersey. His administration of affairs in this province was for the most part wise and satisfactory to the people, and he remained in office until his death. As a governor, especially in Massachusetts and New Hampshire, he was arbitrary and opinionative, reckless in invective against his opponents, not above the arts of cajolery and flattery, inordinately fond of display, and ostentatiously pious. He has been spoken of as 'the most perfect example of a New England courtier in a corrupt age.' On the other hand, he was a good administrator, rigidly enforced the laws, and seems for the most part sincerely to have desired to promote the public welfare. In 1756 he gave his library of 400 volumes to the College of New Jersey (now Princeton), and it was he who chose the name for Nassau Hall. Many of Belcher's letters, written between 1730 and 1741, were published in the *New England Historical and Genealogical Register* for 1865, and *The Belcher Papers*, with a biographical preface, were published by the Massachusetts Historical Society in 1893. Consult *Collections of the Massachusetts Historical Society*, Vol. VI. (Boston, 1893).

BELCHITE, bĕl-chē′tȧ. A town in the Province of Saragossa, Spain, on the Aguas, a tributary of the Ebro, 25 miles southeast of Saragossa (Map: Spain, E 2). It is celebrated as the scene of the battle of June 18, 1809, in which the French under Suchet completely routed the Spaniards under General Blake, capturing all their guns, with a loss of only 40 men to themselves. Population, in 1897, 3409.

BELCIKOWSKI, bĕl′tsē-kôv′skē, Adam (1839—). A Polish writer, born at Cracow. He graduated in 1865 at the university there, and in 1868 was appointed an instructor in Polish literature at the University of Cracow. He has written much, chiefly drama and literary criticism, his publications including: *Adam Tarło* (1869); *Hunyadi* (1870); *Francesca da Rimini* (1873); *King Boleslav the Bold* (1882); and several essays in *Ze Studyów nad Literatura Polską*, edited by Chmielowski (1886).

BELCK, Waldemar (1862—). A German traveler and archæologist, born in Danzig. He studied chemistry, in 1884 accompanied the expedition which founded the German West African possessions, and after 1888 became connected as an electro-chemist with various commercial establishments. In 1891, and again with Friedrich Lehmann, in 1898-99, he traveled extensively throughout Armenia, studying the remains of the primitive Turanian civilization, collecting a large number of new inscriptions, and making geographical observations.

BELED-EL-JERID, bĕl′ĕd-ĕl-jē-rēd′. A region of North Africa, between Algeria and the Great Desert, east of Morocco. It contains a number of oases, noted for their extensive production of dates.

BELEM, bȧ-lāN′. A city of Brazil. See Pará.

BELEM. A suburb of Lisbon (q.v.).

BELEM′NITES (Gk. βέλεμνον, *belemnon*, dart, javelin). A genus of dibranchiate cephalopods of the extinct order Belemnoidea, allied to the modern squid. That portion of the shell usually found is the 'rostrum,' or 'guard,' a solid, cigar-shaped organ, more or less pointed at one end, and pierced at the other extremity by a conical cavity called the 'alveolus.' In perfect specimens there fits into this alveolus a conical chambered shell, the 'phragmocone,' which seems to be homologous with the similarly chambered shell of the Nautiloidea and Ammonoidea. This phragmocone, which is provided with a siphuncle, has an initial chamber which closely resembles that of the primitive Ammonoidea, notably the genera Bactrites and Mimoceras, and even more closely the modern dibranchiate genus Spirula, thus indicating the affinities of belemnites. Above the phragmocone, and developed as an anterior extension of its dorsal wall, is the 'proöstracum,' a more or less calcified plate that becomes the 'pen' in the modern squid and cuttlefish, and which probably served to protect the vital organs and to give rigidity to the forward portion of the body. The entire shell was internal.

Some traces of the soft parts of the animal have been found, so that it has been possible to restore the outline of the body and the form of the fins. The general structure seems to have been quite like that of the modern squid, with its long posteriorly pointed body, provided with fin-like marginal expansions of the mantle. There were ten arms, and these were furnished with strong horny hooks that assisted the creature to seize its prey. Mandibles, and, most interesting of all, the hardened contents of the ink-bag have also been, in a few rare cases, preserved. The belemnites are, together with the Ammonoidea, the most characteristic of Mesozoic fossils, and they are found commonly in rocks of Lower Lias (Jurassic) to Upper Cretaceous age, in Europe, North America, and Asia. A single slab of Liassic rock from Whitby, England, now in the geological collection of the museum in Paris, has about 900 specimens on a surface 20 inches square. Some 350 species are known, and they range in form and size from elongated delicate kinds to short, stout varieties.

Belemnites is one of the earliest known fossils, and its history is quite interesting. It has received many names that have expressed various ideas regarding its form, nature, and origin. The shell is supposed to have been known to Pliny, but the name belemnites was first applied to it by George Agricola in 1546. Previous to that time it had been called '*lingurium*,' and was supposed to be the urine of a lynx petrified into amber. Popular names were 'devil's-finger' and 'thunder-stone,' and they were used in early times as remedies for nightmare and other maladies. Later naturalists classed them as forms of amber, stalactites, sea-urchin spines, crocodile and fish teeth, and as chambers in which dwelt small marine animals. In 1724 Ehrhardt first recognized their affinity to Nautilus and Spirula. For illustration, see CEPHALOPODA.

BELE′RIUM. An ancient name for Land's End, the southwestern extremity of Cornwall, England, sometimes written BOLERIUM. The name is of doubtful origin, though sometimes derived from Bellerus, a legendary Cornish giant.

BELFAST, bĕl-fäst′ (Gael. *Bel-feirsde*, the fort of the far set or sand-bank). The principal commercial and manufacturing city in Ireland, the chief town of Antrim County, and capital of the Province of Ulster. It stands at the mouth of the Lagan and the head of Belfast Lough, 12 miles from the Irish Sea, and 86 miles north-northeast of Dublin (Map: Ireland, F 2). The city site is reclaimed marshland. On the land side it is picturesquely bounded by the ridges of Divis (1567 feet high) and Cave Hill (1185 feet). It is connected with its suburbs on the Down, or south side, by four bridges. Many of the streets, especially in the White Linen Hall quarter, are well built and spacious. The mercantile section lies chiefly near the extensive and well-built quays. Churches abound, and the public buildings include the Linen Hall, commercial buildings, several fine banks, the Corn Exchange, the government offices, clubhouses, and museum. The Royal Academical Institution, Queen's College, and the Government School of Design are the chief of many educational establishments. The fine botanical gardens of the Natural History Society occupy 17 acres, and there are five public parks, inclosing 200 acres.

The staple manufacture is linen, dating from 1637. Other branches of industry are bleaching, dyeing, calico-printing, iron-founding, flour and oil mills, chemical works, breweries, distilleries, alabaster and barilla mills, sawmills, shipbuilding, rope, and sail-cloth yards. The iron shipbuilding yards in the harbor employ a large number of hands, and have built among other important vessels the ships of the White Star Line. The inland trade is carried on by the Lagan, the Ulster Canal, and several railways; and lines of steamers constantly ply between Belfast and the ports of Great Britain. The harbor is one of the first-class ports of the United Kingdom, and has several docks and basins, the largest being the Abercorn Basin and the Spencer Tidal Dock. The harbor is under the control of commissioners elected by the ratepayers. The most important branch of commerce is the Channel trade. Linen yarns and manufactures, machinery, mill and metal work, cattle, agricultural produce, provisions, and whisky are the chief exports. The imports include grain and raw products, cotton, flax, linen yarn, timber, sugar, etc. From 1896 to 1900 the annual value of the total imports and exports increased from $21,000,000 to $36,000,000. An average of 11,000 vessels enter and clear annually. One hundred and ten steamers of 109,000 gross tonnage, and as many sailing vessels, of 30,000 tons, are inscribed on its own shipping register. It is the seat of a United States consulate.

Belfast is governed by a corporation of 10 aldermen (one being mayor) and 30 councilors, and is noted for its municipal activities. It owns the harbors, ferries, abattoirs, markets, gas and electric-lighting plants, tramways; maintains a fire brigade, free libraries, museums, artisans' dwellings, and controls the elementary schools. Population, in 1821, 37,000; in 1851, 103,000; in 1891, 273,000; in 1901, 349,000. Belfast was destroyed by Edward Bruce in the Fourteenth Century, but became an important town after 1604, receiving a charter in 1611. In the great Civil War the inhabitants at first joined the Parliament, but afterwards were Royalists. It became a city in 1888. The *Belfast News-Letter*, established 1737, is the chief newspaper, and the third oldest published in the United Kingdom.

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BEL′FAST. A city, port of entry, and the county-seat of Waldo County, Maine, 30 miles southwest of Bangor, on Penobscot Bay, at the terminus of the Belfast Division of the Maine Central Railroad (Map: Maine, E 7). There is a good harbor, and the principal industries are the manufacture of shoes, doors, sashes, and blinds, leather, boards, and ship-building. It has a public library of 9600 volumes, a Masonic Temple, and Odd Fellows' Building. Settled by Scotch-Irish in 1770, Belfast was incorporated as a town and named (from Belfast, Ireland) in 1773, and was chartered as a city in 1850. The charter now in force was adopted in 1853, and provides for a mayor elected annually and a bicameral city council. Population, in 1890, 5294; in 1900, 4615. Consult Williamson, *History of the City of Belfast* (Portland, 1877).

BEL′FIELD. The name of a character in Miss Burney's novel *Cecilia.*

BEL′FOND. A polished roué in Shadwell's comedy, *The Squire of Alsatia.*

BEL′FORD. A character in Samuel Richardson's novel *Clarissa Harlowe.* He and Lovelace agree to excuse in each other every breach of etiquette.

BELFORT, bĕl′fōr′ (Fr. *beau*, OF. *bel*, beautiful + *fort*, fort, citadel). The capital of the Territory of Belfort (q.v.), France, a town of great strategical importance on the Savoureuse, commanding the Trouée-de-Belfort, a pass between the Vosges and Jura Mountains (Map: France, N 4). It is dominated by a lofty citadel, on a rock 200 feet high. In front of the citadel is carved the 'Lion of Belfort,' a colossal figure, 36 feet in height and 72 feet long, the work of Bartholdi, which commemorates the defense of 1870-71. Belfort has breweries and tanyards, but its industries are unimportant. The town was ceded to France by Austria in 1648, and was fortified by Vauban. During the war between France and Germany, the town maintained a gallant defense against the German troops from November 3, 1870, until February 16, 1871. It then capitulated with all the honors of war. Since the war Belfort has been converted, by the construction of a vast system of new works, into one of the most impregnable fortresses in Europe. Population, in 1891, 25,445; in 1896, 27,715. Consult Bardy, *Etude historique sur Belfort* (Belfort, 1898-1900).

BELFORT, TERRITORY OF. A department on the eastern frontier of France (Map: France, N 4). Area. 235 square miles. Population, in 1896, 88,169; in 1901, 91,765. It is named after its capital, and is the remnant of the former Department of Haut-Rhin (Upper Rhine), the major portion of which was ceded to Germany by the Treaty of Frankfort in 1871.

BEL′FRY (ME. *berfrey, berfreit,* M. Lat. *ber[c]fredus,* MHG. *bercfrit,* a watchtower, from *berc,* protection, Ger. *bergen,* to cover, hide + *frit, frid,* place of security, tower, Ger. *Friede,* peace). Originally a wooden movable tower for protecting a besieging force in an attack on a fortification, such as Cæsar more than once mentions. Froissart describes one that was employed at the siege of the Castle of Breteuil in 1356; and at the siege of Jerusalem, by the Crusaders, one was carried in pieces, put together just beyond bowshot, and then pushed on wheels to a proper position. Such towers sometimes rested on six or eight wheels, and had as many as fifteen stories or stages; but the height was usually limited to three or four. They were often covered with rawhides to protect them from boiling oil or grease thrown upon them by the besieged, and there was a hinged drawbridge at the top, which was let down upon the parapet of the wall to assist in landing. The lower stage frequently had a battering-ram, while the others were crowded with archers and slingers. See FORTIFICATION.

From this use, the word came to be applied to a watch-tower, beacon, or bell-tower used for alarm and refuge in towns and monasteries, and particularly to the wooden framework from which the bell was hung. In mediæval towns the bell was used not only on special occasions, but regularly, to announce work-hours, sunrise and sunset, town gatherings, as well as fire-alarms and calls to arms. The bell and belfry thus became the emblems of communal freedom; the most conspicuous belfries were those of the town-halls, such as those of Florence and Siena, Saint Quentin and Douai, Brussels and Ypres, Glasgow and Aberdeen; others were isolated square towers, as at Venice, Auxerre and Evreux, Bruges and Ghent, and this was the primitive form; others were connected with city gates, as in some of the Hanse towers, Bordeaux, etc. In the Fourteenth Century clocks as well as sun-dials were for the first time placed on belfries. The term belfry is even more commonly used of the wooden frame for the bell in any bell-tower, even any church-tower, and it was extended to include that part of the structure containing it, that is the upper part of the tower, the bell-chamber or bell-cage. But it is an error to use *belfry* and *bell-tower* or *campanile* as synonymous. The extension of the term belfry from civil structures to include religious ones is late and incorrect. See BELL-TOWER; CAMPANILE.

BELFRY OF BRU′GES, *Fr. pron.* brụzh, THE. See LONGFELLOW.

BEL′GÆ (Lat. nom. pl. of *Belga*). The northernmost of the three great groups into which the Celtic tribes of ancient Gaul were divided. They occupied the territory between the *Sequana* (Seine), *Matrona* (Marne), *Mosella* (Moselle), *Rhenus* (Rhine), and the ocean, comprising the modern Belgium, with parts of Holland and northeastern France. To their south lay the Celtæ, or Gauls proper, and to their east the Germans. The chief of their many tribes were the Remi, Bellovaci, Suessiones, and Atrebates. The Belgæ had also crossed the Channel and settled in southern Britain, in Kent and Sussex. Cæsar came in conflict with the Gallic Belgæ in B.C. 57, and crushed them after a long campaign (Cæs. B. G. II. 1-33); but several of the tribes revolted later on. In the reorganization of the Empire under Augustus, the Belgæ were included in the province of *Gallia Belgica* on the west of the Rhine from the North Sea to the Lake of Constance.

BELGAUM, bĕl-gạm′. The chief city of a district of the same name in the Presidency of Bombay, British India, situated east of the dividing ridge of the West Ghats, about 2500 feet above the sea (Map: India, B 5). Its latitude is 15° 50′ N., and longitude 74° 36′ E., 42 miles northwest of Dharwar. Belgaum possesses a fort, which in 1818 was taken from the Peishwa by the British. The town lies between the fort on the east and the military cantonment. Under its new masters the place has made considerable progress. In 1848 the citizens spontaneously subscribed a considerable sum for the reconstruction of their roads and lanes—a liberality which, besides drawing forth a supplementary grant of public money, roused the emulation of adjacent towns and villages. It has a superior institution for the education of native youths, which is supported by the neighboring princes, the British Government, and private individuals. The town has manufactures of cotton cloth and a trade in salt, fish, coir, dates, and cocoanuts. The average annual rainfall at Belgaum is about 36 inches. Belgaum is one of the principal military stations of the presidency. Population of town, in 1891, 40,700; in 1901, 26,200; of military cantonment, 12,300. Area of Belgaum district, 4656 square miles; population, in 1891, 1,013,000; in 1901, 994,200.

BEL′GIC CONFES′SION. A statement of faith based on Calvinistic principles, written in French, formed by Guido de Bres, of Brabant, and others in 1561, and sent to Philip II. of Spain, to induce him to tolerate the Reformed Faith. It was published in the vernacular in 1562, afterwards translated into Dutch and German, and was received as a symbolical book by the synods of Antwerp (1566) and Dort (1619). It is reprinted in French with English translation, in Schaff's *Creeds*, iii. 383-436.

BELGIOJOSO, bĕl′jō̇-yō′sō̇, CRISTINA, Princess (1808-71). An Italian patriot and author, born at Milan. She did much to assist the Italian patriots in their struggles against Austria. In 1830 she removed to Paris, where she edited the *Gazetta Italiana* and the *Ausonia* in behalf of Italian liberation. In 1848 she returned to Italy, spoke in the cause of freedom, and equipped at her own expense a volunteer corps. Exiled upon the capture of Rome by the French (1849), she returned to Italy in 1861 to found the periodicals *Italia* and *Perseveranza.* Her works include *Souvenirs d'exil*

(1850), and *Réflexions sur l'état actuel de l'Italie.*

BEL'GIUM. One of the smaller European States, situated between latitudes 49° 30′ and 51° 30′ N., and longitudes 2° 33′ and 6° 6′ E. It is bounded by Prussia on the east, France on the south and southwest, the North Sea on the northwest, and the Netherlands on the north. Its total area is 11,373 square miles, and its population, in 1900, was 6,815,054, distributed as follows:

PROVINCES	Area in Sq. Miles	Population, 1890	Population, 1900	Density per Sq. Mile
Antwerp	1,093	699,919	819,159	749
Brabant	1,268	1,106,158	1,263,535	996
West Flanders	1,249	738,442	805,236	644
East Flanders	1,158	949,526	1,029,971	889
Hainault	1,437	1,048,546	1,142,954	795
Liège	1,117	756,734	826,175	739
Limburg	931	222,814	240,796	258
Luxemburg	1,706	211,711	219,210	128
Namur	1,414	335,471	346,512	245
Totals	11,373	6,069,321	6,693,548	589

Topography. Belgium is, on the whole, a level, low-lying country, but the part southeast of the Meuse is occupied by the Ardennes, and attains an altitude of 2200 feet. In Flanders the land becomes so low that in many places dikes must be raised to check the encroachments of the sea. In the northeastern part of Antwerp a naturally unfertile district named the Campine extends along the coast, and is gradually being redeemed by means of canals. The abundant water-system of Belgium is chiefly supplied by the rivers Scheldt and Meuse, both of which rise in France and have their embouchures in Holland. Both the Meuse and the Scheldt are navigable throughout their entire length in Belgium, and receive many tributaries. The Scheldt receives the Lys, Dender, and Rupel, while the tributaries of the Meuse are the Sambre, Ourthe, and Lesse. The natural hydrographical advantages are increased by a system of canals which unite Brussels and Louvain with the Rupel, Brussels with Charleroi, Mons with Condé, Ostend with Bruges and Ghent, and Ghent with Neuzen (Terheuzen), in the Netherlands. These canals are partly for the purpose of navigation and partly for irrigation. The entire length of the navigable waterways in Belgium is nearly 1400 miles.

Climate. The climate of Belgium differs according to the altitude of the region, being temperate, equable, and humid in the low plains along the rivers and coast, and exhibiting greater extremes in the elevated part. In general, it resembles the climate of Great Britain, but the summers are hotter and the winters more severe. The average temperature in the low districts is about 50° F. The indigenous flora and fauna differ in no important way from that of the rest of north central Europe. See *Flora* and *Fauna*, under Europe.

Geology. The oldest geological formations occur in the southern provinces, particularly along the Ardennes, which are an outlier of the Rhenish Highlands of Germany. Archæan and Silurian rocks occupy very small areas in this region, but the Devonian system is important. On the northern slopes of the Ardennes, from Liège on the east to Mons on the west, Carboniferous strata (carrying valuable deposits of coal) outcrop in considerable extent. The low-lying northern provinces of Belgium are underlaid by Mesozoic and Cenozoic sediment, which were deposited in successive order upon the former shore lines, and still retain a nearly horizontal position. Cretaceous and Tertiary strata are most widespread in occurrence.

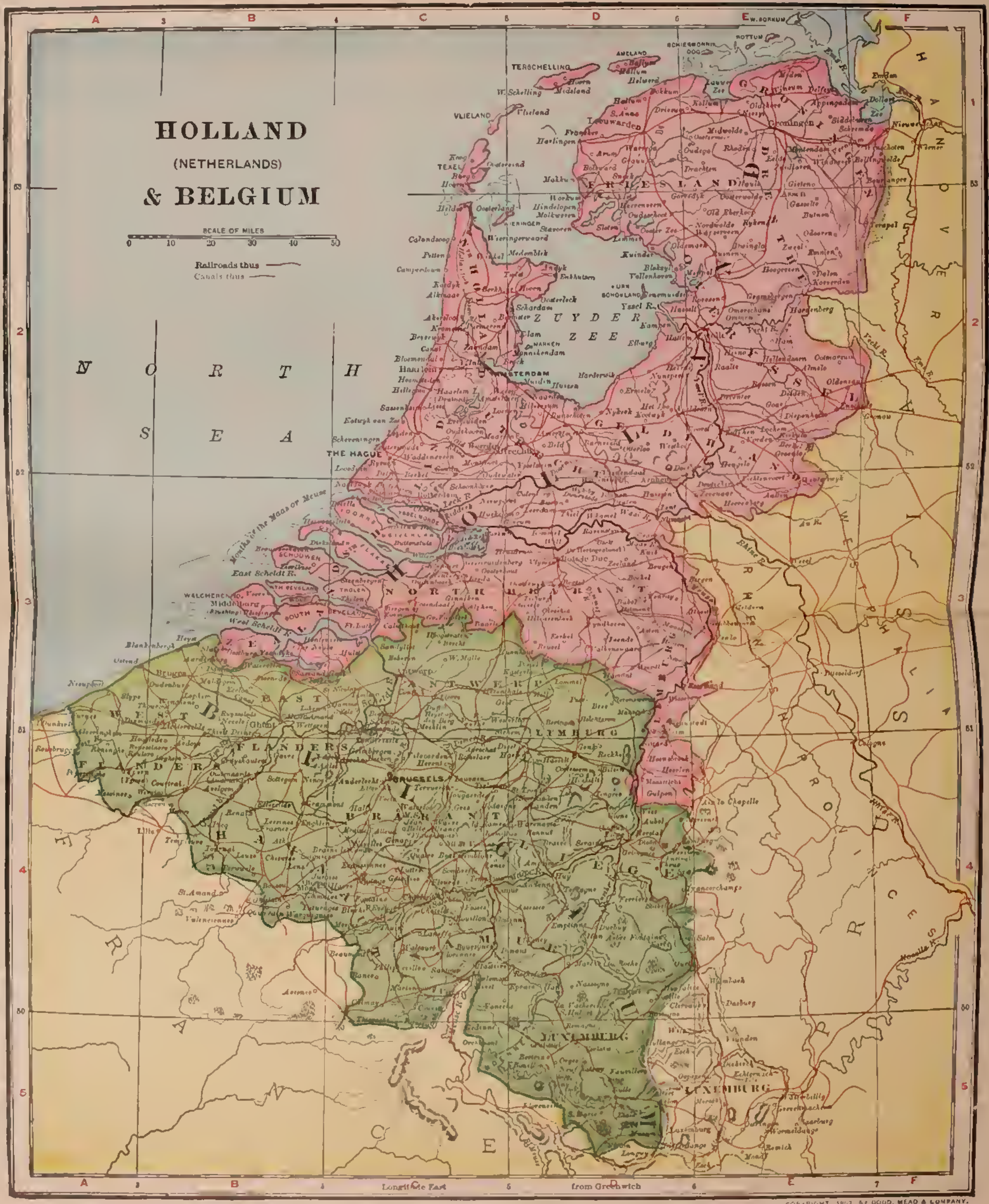
Agriculture occupies a rather subordinate place in industrial Belgium, owing partly to unfavorable conditions, but mainly to the greater inducements offered to capital and labor by mining and manufactures. Such agriculture as exists, nevertheless, has attained a high state of perfection. A Government agricultural board exists in each province, and there are many agricultural societies, which aid and instruct farmers in respect to improved methods of land cultivation, which occupies about one-fifth of the population. As, however, this proportion has been steadily diminishing, the production has long been less than the demand, and cereals and other agricultural products have to be imported from abroad in increasing quantities.

The nature of the various provinces determines the character of their local agriculture. Thus, vine growing takes place mostly along the Maas River; cereal cultivation in the provinces of Antwerp, Brabant, East Flanders, Luxemburg, Namur, and Hainault; cattle-raising on the fertile slopes of the Ardennes and in the rich valleys of the rivers, etc. Over 85 per cent. of the total area of the country is taken up as farms, and of that land 31.05 per cent. is under cereals, 10.16 per cent. under vegetables, 4.06 per cent. under industrial plants, 24.46 per cent. under pasture, 2.60 per cent. under orchards, and 27.67 per cent. under forests and heaths. The chief cereal in the country is rye, to which is devoted more than a third of the total area under cereals; next in importance are oats, with some 30 per cent. of the area, and wheat, with slightly less than a fourth, the remaining 12 per cent. of the area under cereals being devoted to barley, buckwheat, spelt, etc. While the area under cereals has decreased during the last half-century, that under beet-root, tobacco, hops, chicory, flax, hemp, rape, and similar plants has increased 60 per cent. The cultivation of beet-root (for sugar) has made phenomenal progress, as is shown by the area devoted to its cultivation at various periods:

YEAR	ACRES
1846	5,253
1856	19,259
1866	44,133
1880	80,621
1895	133,681

The non-sugar varieties of beet are also raised to a large extent. The chief seat of beet-growing is in the provinces of Brabant and Liège. Potatoes are a leading crop, the acreage devoted to them being greater than that under wheat. Hops and tobacco are extensively grown, and the production of chicory has reached great proportions.

Live Stock. Stock-raising is extensively carried on, and the animals and animal products not only supply the domestic demand, but furnish an important article of export. The dairy industry is especially important—Belgian cheese, and particularly that of Limburg, having a



HOLLAND
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& BELGIUM

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world-wide reputation. The number of stock animals in Belgium is shown as follows:

LIVE STOCK	1846	1880	1895
Horses	294,535	271,974	271.527
Cattle	1,203,891	1,382,815	1,420.978
Hogs	496,564	646,375	1,163,133
Sheep	662,508	365,400	235,722

Horses are mostly raised in Namur and Luxemburg, cattle in East Flanders, sheep in Luxemburg, and hogs in East Flanders. As will be seen from the above table, the number of horses has remained stationary, and that of cattle nearly so, while the number of sheep has greatly declined. On the other hand, there has been a vast increase in the number of hogs.

Land Distribution. The concentration of land-ownership, the relative advantages and chances of survival of small and large farms and the possibilities in the way of application of capital in agriculture in connection with intensive cultivation, have nowhere perhaps been studied with greater care than in Belgium. As the conditions do not differ much from those in the neighboring countries of Western Europe, the agricultural statistics of Belgium are of more than ordinary value. The following table shows what was the land distribution at each of the censuses during the Nineteenth Century:

FARMS	NUMBER OF FARMS				Per Cent. Increase or Decrease—1880-1895
	1846	1866	1880	1895	
Less than 1¼ acres.	247,551	312,290	472,471	458,120	—03.2
From 1¼ to 2½ "	70,413	108,094	121,905	85,921	—29.7
" 2½ to 12½ "	165,933	219,384	226,058	191,833	—15.4
" 12½ to 25 "	42,737	51,650	48,390	49,065	+01.4
" 25 to 50 "	26,585	30,996	25,983	28,151	+08.3
" 50 to 125 "	14,998	16,066	12,186	13,151	+07.9
More than 125 "	4,333	5,527	3,403	3,584	+05.3
Total	572,550	744,007	910,396	829,825	—09.7

(+) Increase. (—) Decrease.

The above table discloses the interesting phenomenon that, while the small farms (those with an acreage of less than 12½ acres each) had been increasing in number previous to 1880, and those with a larger acreage decreasing, the tendency has been reversed in our times, and since 1880 the small farms have been giving place to the larger ones. (The word 'large' is applied to a farm in Belgium that would be considered very small indeed in the United States; but in Belgium the intensive system of cultivation makes it possible to apply a comparatively large amount of capital to a small area.) Within the group of small farms the smallest, those of less than 1¼ acres in extent, mostly gardens or orchards attached to houses, have decreased only 3 per cent. since 1880, while those from 1¼ to 2½ acres have decreased nearly 30 per cent., and from 2½ to 12½ acres 15½ per cent. The largest increase took place in the two groups from 25 to 125 acres, viz., 8 per cent. At the same time there has been an increase in the number of tenants cultivating land. In 1846 54.7 per cent. of the total area under farms was cultivated directly by their owners; in 1866 only 50.3 per cent; in 1880 the proportion increased again to 53 per cent., to fall in 1895 below one-half of the total—viz. 49.4 per cent. The changes in agriculture which accompanied this concentration of land and increase of tenantry have been partly, as stated above, a gradual abandonment of grain-growing (caused to a great extent by the competition of the cheaper American grain), and the substitution of the cultivation of industrial plants, or of stock-raising, or of activities partaking more of the industrial than agricultural character.

The forests of Belgium cover less than 15 per cent. of its area, and are mostly to be found in the south, especially in the provinces of Liège, Namur, and Luxemburg. They furnish but a small part of the wood required for the Belgian industries. The fisheries furnish employment to a few thousand persons, and the value of the deep-sea fish caught annually is not far from $1,000,000.

Mining. The coal of Belgium constitutes one of the chief sources of its national prosperity. The coal deposits extend nearly through the entire breadth of the country, from west to east, underlying about one-twentieth of its total area, chiefly along the valleys of the Meuse and the Sambre. The growth of the coal-mining industry during the last half of the Nineteenth Century is shown in the following table:

Production and Value of Coal in Belgium

	1850	1870	1890	1899
Metric tons (2204 lbs.)	5,821,000	13,697,000	20,366,000	22,072,068
Value	$9,294,000	$29,727,000	$53,701,000	$54,889,000
Persons empl'd	47,949	91,993	116,779	125,258

Among the minerals found in Belgium are iron, lead, copper, zinc, calamine, alum, peat, marble, limestone, and slate. The value of the metallic products of the mines is not large, having been less than $500,000 in 1899, and having greatly declined since 1860. The abundance of cheap fuel has led to the establishment of an extensive metallurgical industry, the ores being imported.

Manufactures. The manufactures of Belgium constitute its chief source of prosperity. They are many and varied, differing not only in the kind of products turned out, but also as to the scale on which they are carried on; for a large number of persons still work with their own tools in home workshops, with little or no help of hired workmen. The two sides of Belgium's industrial developments—the progress in the use of machinery and the survival of the small industry—are well illustrated by the following figures: In 1846 the number of steam-engines employed in all the industries of Belgium was 1514, with a total of 37,007 horse-power; in 1880 there were 7816 steam-engines, of nearly 210,000 horse-power; while in 1896 the horse-power employed exceeded 628,000. On the other hand, out of a total of about 330,000 industrial establishments of all kinds (including mines) in 1896, there were still 87,000 'establishments' conducted in the living-rooms of the workmen without any hired help. In these 87,000 'establishments,' there were engaged at work 118,747 people, or less than two for each establishment. If we add that only 41,689 of these were men and 77,058 were women, it becomes apparent that the house industry thus maintained is largely carried on by members of the family as a mere subsidiary employment. That does not represent, however, the entire extent of the small industry, as a large number of workshops employ two, three, or a few more persons, with little or no machinery, and the employers of all of these are included in the total of 704,229 people working for wages. Since they were employed in 242,000 establishments, the average number of employés per establishment is a little more than three—a clear indication of the prevalence of small workshops. The total number of people engaged in manufactures in 1896 was 1,119,259, including employers and office force, as well as workmen. The following table gives an account of the Belgian manufactures in the order of their importance, shown by the census of 1896.

Industries	Total No. of people engaged	Per cent. of the total industry	Workmen employed outside of their homes	Workmen employed in their homes	Working women employed outside of their homes	Working women employed in their homes	Steam-power employed (horse-power)
1. Textile	169,493	15.4	44,502	18,720	38,340	58,167	67,480
2. Clothing	137,903	12.5	8,227	5,409	37,109	8,247	849
3. Metal	133,875	12.1	100,125	7,303	3,297	372	75,600
4. Mining	128,313	11.7	112,314	....	9,679	....	134,415
5. Building	93,492	8.5	66,685	....	553	....	5,775
6. Food Products	90,285	8.2	58,537	....	3,031	2	64,590
7. Lumber and Woodwork	88,526	8.1	47,338	1,528	788	776	7,428
8. Hides and Leather	75,660	5.2	18,621	7,494	2,640	4,916	3,087
9. Transport	41,882	3.8	17,995	....	1,159	... .	195,110
10. Quarrying	39,004	3.5	34,769	155	568	375	20,301
11. Special	24,434	2.2	9,438	689	5,050	3,719	8,642
12. Glass	22,797	2.1	18,523	....	3,174	....	12,781
13. Chemical	20,715	1.9	14,961	19	2,747	29	15,279
14. Printing	14,049	1.3	10,200	....	745	....	1,336
15. Tobacco	12,033	1.0	7,530	180	2,344	264	478
Other Industries	26,798	2.5	18,483	192	4,747	191	15,102
Total	1,119,259	100.0	588,248	41,689	115,971	77,058	628,253

The chief branches of the textile industry are the manufacture of linen, mainly centring at Brussels, Ghent, Bruges, Courtrai, Tournay, and Mechlin; the woolen manufacture, employing many thousands of persons at Verviers, Liège, Dolhain, Ypres, Bruges, Limburg, and other towns; and the cotton industry, carried on in the same cities as the linen manufacture, besides Antwerp. Among the more fancy articles must be mentioned the Brussels and Tournay carpets; Brussels and Bruges lace, one of the most expensive kinds in the world; and the lawn and damask fabrics manufactured at Bruges.

Although the output of the metals mined in Belgium is small, the metal industry is highly important, ranking third in the number of people employed, and being next to the textile industry in the value of its products, the iron and steel industry especially being on a vast scale. The principal seats of the metal manufacture are Liège, Namur, Charleroi, Mons, and their neighborhoods. There are large ordnance foundries at Liège and Mechlin, and celebrated makers of firearms and machinery in Liège. Among other branches of Belgian industry are nail-making at Charleroi; tinware, etc., at Liège and in Hainault; wire and brass factories at Namur; zinc manufactures at Liège; lead and shot factories at Ghent; and the manufacture of gold and silver goods at Brussels and Ghent. The glassworks of Belgium lead the world. The chief works are in Hainault, Brabant, and Namur, and at Val Saint Lambert. Porcelain-ware is manufactured at Tournay, Brussels, Ghent, and Mons.

Railways. Belgium has a greater railway mileage in proportion to its area than any other country. The first railway was opened for traffic in May, 1835, from Mechlin to Brussels, a distance of thirteen miles. During the first few years all railway construction was done by the Government, but in 1842 private companies were permitted to enter the field. Most of the private lines, however, were bought out subsequently by the Government, that policy being pursued with especial energy since 1897, so that at the close of the year 1900 the State owned 2503 miles, as against 330 miles owned by private companies. The growth of the Belgian railway system is shown by the following figures: Length of lines in 1835, 8⅓ miles; in 1855, 404; in 1875, 1219; in 1895, 2045; in 1899, 2833.

Shipping and Navigation. Belgium has a flourishing merchant marine, which is, however, unable to carry more than a fourth of the country's goods. The number of vessels increased from 58, with a tonnage of 86,000, in 1895, to 73, with a tonnage of 109,000, in 1899. Of these only 6 were sailing vessels, with a tonnage of 2750. The shipping during the same period increased from 13,670,000 to 17,154,000 tons, carried in 14,476 and 17,253 vessels, respectively. Nearly one-half of the entire shipping is done in British vessels; a little over one-eighth is carried in German vessels, and one-fourth in Belgian vessels. There are in Belgium 1370 miles of navigable waters (rivers and canals), which float a large commerce. Practically all the leading towns are connected in this wise. The Scheldt and the Meuse are navigable from France to the sea.

Commerce. As a manufacturing country, Belgium requires mainly food-products and raw materials from abroad in exchange for its manufactures. The chief articles of import include cereals, cotton, wool and flax, metals, chemicals, drugs and resins, mineral substances, lumber, textiles, oil-seeds, hides, animals and animal products, coffee, caoutchouc, and machinery; while the chief exports include iron and steel (with manufactured wares), raw textile materials, yarn and thread, coal and coke, glassware, railway-cars, machinery, chemicals and dyestuffs, minerals, zinc, cereals, and sugar. The following figures show the growth of Belgian commerce for the greater part of the Nineteenth Century, the larger part of both exports and imports being, not by sea, but by land and river:

General Commerce	1835	1850	1860	1870	1880	1890	1900
Imports	$34,500,000	$47,300,000	$103,300,000	$184,200,000	$336,200,000	$334,400,000	$718,900,000
Exports	27,600,000	52,700,000	93,900,000	138,000,000	243,300,000	287,400,000	659,500,000
Transit trade	4,500,000	41,300,000	81,700,000	166,300,000	201,700,000	302,200,000	274,900,000

The table reveals the remarkable growth of Belgium's commerce since 1835, as well as its unprecedented increase in the last decade of the century, which quite exceeded 100 per cent. both in imports and exports. The only branch of trade that suffered a setback during the last decade was the transit trade, although this also has improved since 1894, when it reached the low-water mark of $224,000,000. An interesting feature of Belgium's commerce is the large excess of its imports over its exports—a condition which has not changed since 1860. Far from being a drawback to the country, this 'unfavorable' balance of trade has been one result of Belgium's commercial and financial expansion. The investments of Belgian capital abroad, especially in Russia and in Asia, are unusually large, and the surplus imports represent nothing but the materialized profits of foreign investments accruing to Belgian capitalists. The principal countries participating in Belgium's trade, in the order of their importance, are France, Germany, Great Britain, the Netherlands, the United States, Russia, and Argentina. In the foreign trade of the United States Belgium plays an important part. It ranks fifth in the value of its imports from the United States and seventh in the exports it sends there, being behind only Great Britain, Germany, Netherlands, and France in imports, and behind these countries and Italy and Switzerland in exports.

The following table shows the course of the Belgian-American trade during the last decade of the century:

Year	Imports from United States to Belgium	Exports to United States from Belgium
1891	$27,500,000	$10,900,000
1892	48,800,000	10,300,000
1893	26,700,000	11,200,000
1894	28,400,000	8,600,000
1895	25,200,000	10,100,000
1896	27,100,000	13,800,000
1897	33,100,000	14,100,000
1898	47,600,000	8,700,000
1899	44,200,000	10,600,000
1900	48,300,000	12,900,000

Banking. The banking system of Belgium centres in the National Bank, established in 1850 with a capital of $5,000,000, increased to $10,000,000 in 1872, when its charter was renewed until 1903. In 1900 its charter was extended to January, 1929. It is the sole bank of issue in the country, and in addition to doing a general deposit and discount business with private individuals, serves as a repository of State moneys, and has general charge of all the operations of the State treasury. The services to the State are performed free of charge, and in addition a certain amount is paid to the State annually for the privilege of handling its moneys. The bank has numerous branches throughout the country. It also conducts, free of charge, all the financial operations of the State Savings and Pension Institution, established in 1865. There are, in addition, several private banks and banking institutions, the oldest of which is the *Société générale pour favoriser l'industrie nationale.*

Finance. The following figures show the growth of the Belgian budget, as well as the relation between revenue and expenditure:

Year	Revenue	Expenditure	Surplus or Deficit
1835	$18,200,000	$17,400,000	+ $800,000
1850	26,500,000	23,700,000	+ 2,800,000
1870	41,100,000	43,400,000	— 2,300,000
1890	75,700,000	83,600,000	— 7,900,000
1898	136,000,000	138,700,000	— 2,700,000

(+) Surplus. (—) Deficit.

The deficit is really much larger than it appears from the table, owing to the fact that the revenues include the amounts raised by loans in order to meet or reduce the deficits from year to year.

Besides suffering from a chronic deficit, Belgium has a system of taxation which is burdensome to the masses of the population. In 1854 the direct taxes constituted 25 per cent. of the revenue of the State, and the indirect, 28 per cent. In 1901 the proportion of direct taxes fell to about 10 per cent., while that of the indirect taxes rose to about 35 per cent. The chief sources of direct taxation are property taxes, personal taxes, taxes on trades, etc.; the most important indirect taxes are import duties, and excise duties on whisky, beer, vinegar, tobacco, and sugar.

In addition to taxation, revenues are derived from State domains and forests, State railways, telegraph, post-office, and other Government institutions conducted on a business basis. The largest item of expenditure, next to that on railways, posts, telegraphs, and telephones—which need not be considered here, as it is more in the nature of a profitable investment than a source of expense to the State—is the service of the public debt, which absorbs more than a fourth of the ordinary revenue of the State. The Ministry of War spends nearly twice as much as that of Interior and Public Instruction, and is followed by the Ministry of Finance and Public Works.

Public Debt.—Most of Belgium's debt has been incurred for profitable undertakings, especially in connection with her railway enterprises. The national debt has grown as follows:

1835	$23,400,000
1850	125,300,000
1870	136,600,000
1890	403,600,000
1900	532,200,000

Of the $532,200,000, $44,000,000 represents the old Netherland debt, $10,700,000 is a non-interest-bearing floating debt, and the rest represents the growing consolidated 3 per cent. debt. The payment on the debt requires more than $26,000,000 annually, including sinking-fund payments.

Population. Belgium is the most densely peopled country in Europe, the average population being about 600 per square mile.

The density of population has been shown for each province in the first table of this article.

The increase of the population may be seen from the following figures obtained by successive general censuses:

Year	Population	Increase per Cent. per Annum
1846	4,337,196	
1856	4,529,560	0.44
1866	4,827,833	0.65
1880	5,520,009	1.02
1890	6,069,321	0.99
1900	6,815,054	1.22

The increase during the last decade was the largest in the history of the country.

As in all well-settled old countries, there is a surplus of women over men, the figures for 1900 being 3,398,997 men and 3,416,057 women. There are four cities with a population exceeding 100,000: Brussels, Antwerp, Liège, and Ghent.

Immigration and Emigration. Belgium presents an exception among the countries of Western Europe in that it has a greater immigration than emigration. The following table shows the growth of the two movements for the last four decades of the century:

Years	Annual Average Figures of	
	Immigration	Emigration
1861-1870	10,749	10,349
1871-1880	15,499	11,472
1881-1890	19,207	17,698
1891-1900*	26,800	22,900

* Round figures.

Immigration is greatest from France, Germany, and the Netherlands, the three countries furnishing nearly 90 per cent. of the total. Curiously enough, emigration is distributed in about the same proportions among the same countries, only an insignificant proportion (about 2 per cent.) going to the United States; all of which shows that the character of the emigration movement in Belgium is quite different from that in the countries of Germany, Austria, Italy, and the United Kingdom, from which the bulk of the emigration to the United States is drawn. The emigration from Belgium is evidently of a temporary nature, the people going to and coming from the three neighboring countries mentioned as their interests require, but evidently not changing permanently their place of abode.

Religion. With the exception of about 10,000 Protestants and some 4000 Jews, all the people of Belgium are Roman Catholics. Religious liberty is untrammeled. The Church must derive most of its material support from the people. The State, however, grants some subventions to the ecclesiastical orders, the total barely exceeding $1,400,000 per annum. The country is divided into the six dioceses of Mechlin, Bruges, Ghent, Tournay, Namur, and Liège.

Education. The educational system comprises secular institutions supported by the State or the local governments, and the schools maintained and managed by the Roman Catholic priesthood. The efforts of the clergy to obtain control of popular education have been a principal feature of Belgian politics for a number of decades. The Constitution of 1831 totally separated Church from State, but conceded to the Catholic clergy as representatives of what was practically the only faith in Belgium the right of imparting religious instruction in the public schools; the Liberal Party, abetted by the growing Socialist Party, has made repeated efforts to do away with religious teachings in the schools and to substitute purely secular education; but the preponderating Catholic majority has always sustained the present denominational system. Higher education is provided for by the State universities at Ghent and Liège, and the free universities of Brussels and Louvain, all of which give courses in law, medicine, philosophy, and science; and at Louvain instruction is given in Catholic theology. Annexed to the universities are schools of engineering, manufactures, arts, and mines. In addition there are a large number of normal, commercial, and industrial schools, a Royal Academy of Fine Arts at Antwerp, and schools of design and music. The secondary schools comprise the royal athenæums (35) and the high schools (128), which are supported and controlled by the Government; the number of institutions of secondary learning which are under the independent control of the clergy is probably equal to the number of State schools. Primary education is left to the care of the communes, in every one of which there must be at least one elementary school; the State and the provinces, however, subsidize the communal schools and exercise the right of inspection. In the closing years of the century the primary schools for children were attended by about 800,000 pupils, and the primary schools for adults by upward of 100,000.

Government. The government of Belgium is a "constitutional, representative, and hereditary monarchy," based on the Constitution of 1831, which guarantees to the citizen equality before the law, personal liberty and security, the right of association and petition, and the freedom of worship, instruction, and the press. The Crown is hereditary in the direct male line, and on the failure of male issue, the monarch, with the consent of the Chambers, appoints his successor. The King is commander-in-chief of the army, concludes treaties of war and peace, nominates officials, and issues decrees, but has no power to suspend the execution of the laws. He rules through a council of ministers responsible to the Chambers, and every royal act must be countersigned by a minister. The departments of State are eight in number, and comprise the Ministries of Finance and Public Works; Interior and Instruction; Foreign Affairs; Justice; War; Agriculture, Industry, and Labor; Railways, Posts, and Telegraph. The legislative power is vested in the King and the Chambers, consisting of the Senate and Chamber of Deputies. The Senate was composed, in 1900, of 102 members, of whom 76 were chosen by the direct suffrage of citizens over the age of 30, and 26 by the provincial councils. The Chamber of Deputies, which numbered 152 in 1900, is elected by the direct suffrage of every citizen over the age of 25. The Chambers meet annually for a session of at least 40 days, but the power of prorogation and dissolution rests with the King. Bills dealing with the revenue and the annual contingent for the army must originate in the Lower House. Superimposed on manhood suffrage, which makes every male Belgian not legally disqualified an elector, there is the system of plural suffrage, which gives an additional vote to citizens over 35 years of age possessing legitimate issue and paying at least five francs a year in house-tax, as well as to citizens owning real estate to the value of 2000 francs, and two additional votes to professional men and the holders of diplomas from institutions of higher learning. In 1900 about 1,450,000 electors cast about 2,240,000 votes. By the law of December 29, 1899, the method of proportional representation was initiated, according to which every party is represented in the Chambers in the proportion of its vote to the total poll. The effect upon the relations of political parties was immediate. The Catholics were deprived of the absolute ascendency they enjoyed under the majority system, and a formidable opposition was created, composed of Socialists and Liberals, to the latter of whom the new measure was especially welcome, in that it rescued them from the state of almost total insignificance to which they had been reduced. For arms of the country, see plate accompanying HERALDRY.

Local Government.—Belgium is divided into 9 provinces, each under a governor appointed by the Crown. The provincial council, which is chosen by direct suffrage for a period of eight years, deliberates on matters of local finance and administration, sanitation, roads, and police, and assesses direct contributions toward the State among the communes. Its acts are subject to the approval of the King. A permanent deputation, consisting of the governor and six men chosen from the council, serves as an executive committee, and directs public affairs when the council is not in session. The provinces are subdivided into 41 arrondissements for administrative purposes, and into 26 judicial arrondissements, which are the seats of high courts of original jurisdiction; and these are again portioned out into 215 cantons, each under a justice of the peace. The ultimate unit of local government is the commune. In 1899 there were 2612 communes. Of these, 86 bore the ancient title of *ville*, or town. The affairs of the commune are debated and decided in the communal council, varying in membership from 7 to 51, and elected directly for a period of eight years by all resident citizens above the age of 25. In communes of more than 2000 inhabitants, supplementary councilors are elected by employés and working men. The communal council exercises independent jurisdiction over local affairs, but deliberates also on matters delegated to it by the general or provincial government. The executive work of the commune is carried on by an aldermanic college, consisting of a burgomaster appointed by the King, and two or four aldermen elected by the communal college.

Justice in the case of petty civil disputes and minor offenses is administered by the justice of the peace, from whose decision there is no appeal in judgments involving less than 100 francs ($20), or a penalty of not more than five days' imprisonment. For the trial of important civil cases there are 26 courts of first instance, while misdemeanors are brought before the tribunals of correction, and serious crimes and press offenses before jury courts of assizes sitting four times a year in every province. From the civil courts and the *cours d'assise* appeals lie to the *cours d'appel* at Brussels, Ghent, and Liège. The Court of Cassation, or supreme court, does not examine the facts of any case, but will reverse a decision of the lower courts where legal formalities have been violated. There are in addition special military and commercial courts and councils of *prud'hommes* for the arbitration of labor disputes, composed of workmen and employés.

ARMY. The army of Belgium is intended only for the purpose of national defense and the preservation of neutrality, wars of aggression being forbidden by the Constitution. The army is recruited mainly by voluntary enlistment, but conscription by lot from among all male Belgians over the age of nineteen is resorted to whenever enlistment does not supply the full quota fixed by Parliament for the year. Substitution is allowed. The contingent raised by conscription for the year 1901 amounted to 13,300 men—the usual annual quota. In addition to the Regular Army of 51,552 men there is the Civil Guard, comprising about 40,000 men. The war strength is about 143,000 men. The terms of military service are eight years in the active forces (of which time two-thirds are spent on furlough) and five years in the reserve. See article ARMIES. Belgium has no navy.

HISTORY. Belgium takes its name from the ancient Celtic people called the Belgæ (q.v.). The Roman Province of Gallia Belgica embraced a much greater area than modern Belgium, extending from the mouth of the Scheldt nearly to the Seine, and from the Strait of Dover to the range of the Vosges. In the Fourth Century the Germanic people of the Franks pressed forward into this region, and in the Fifth Century they became masters of it. After the disruption of the Frankish realm in the Ninth Century, the bulk of what is now Belgium was included in the Duchy of Lorraine (Lotharingia), which formed part of the realm of the Eastern Franks (kingdom of Germany), while in the extreme west arose the county of Flanders, a fief of the kings of France. In the Tenth Century the northern half of Lorraine became the Duchy of Lower Lorraine, the name of which was supplanted by that of Brabant in the Thirteenth Century. Brabant was one of several States that were formed out of the Lotharingian territories, the group including Limburg (annexed to Brabant in 1288), Hainault, Namur, Mechlin, Luxemburg, and the ecclesiastical principality of Liège. In the latter part of the Middle Ages Flanders (which successfully withstood the encroachments of France) and Brabant attained to an almost unexampled degree of prosperity. Bruges, Ghent, Antwerp, Brussels, and other cities became the seats of a vast industry and commerce, and the arts flourished as nowhere else outside of Italy. In 1384 Flanders was united with Burgundy, whose dukes by the middle of the Fifteenth Century had come into possession of the greater part of the Belgian and Dutch Netherlands. The rulers of Burgundy aimed at founding a powerful State between France and Germany, and therefore endeavored to repress the free republican spirit which manifested itself in the rapidly rising towns; but the work of establishing an absolute monarchy was interrupted by the fall of Charles the Bold. By the marriage of Mary, daughter of Charles the Bold, with Maximilian in 1477, the Burgundian realm, the most opulent in Europe, passed (with the exception of the Duchy of Burgundy itself) to the House of Hapsburg. On the accession of Charles (the future Emperor Charles V.), grandson of Mary and Maximilian, to the throne of Spain in 1516, the Netherlands were united with that kingdom, and in 1549 their formal union with the Spanish Crown was decreed. The despotic measures of Philip II., the son and successor of Charles, excited in the Netherlands a long and bloody war for civil and religious freedom, which ended in the independence of the northern or Dutch Netherland, while in the southern provinces (modern Belgium) both the sovereignty of Spain and the rule of the Roman Catholic Church continued. In 1598 the Belgian Netherlands were ceded by Philip II. to the Archduke Albert, who married Isabella, daughter of the King, and for a brief time the country became a distinct and independent kingdom. Several measures for the better regulation of internal affairs, especially in the administration of justice, and for the revival of industry, which had been injured by the unenlightened policy of Philip, were projected. Unfortunately, Albert died childless in 1621, and Belgium fell back into the hands of Spain, and became involved in the wars attending the decline of the Spanish monarchy. Peace generally was concluded at the cost of Belgium. By the Treaty of the Pyrenees (1659), the county of Artois, Thionville, and other districts, were given to France. Subsequent conquests by the same powerful neighbor secured to it, at the Peace of Aix-la-Chapelle (1668), the possession of Lille, Charleroi, Oudenarde, Courtrai, and other places. These were partly restored at the Peace of Nimeguen (1678); but as a compensation, Valenciennes, Nieuport, Cambrai, Saint Omer, Charlemont, and other places, were given up, and only partially regained at the Peace of Ryswick in 1697. After the conclusion of this treaty, at the close of the reign of Charles II. of Spain, some endeavors were made to create prosperity in Belgium by a new system of taxation and customs, and by the construction of canals to counteract the injury done to its commerce by the closing of the navigation of the Scheldt. But these projected improvements were interrupted by the War of the Spanish Succession, concluded by the Peace of Utrecht in 1713. By this treaty Belgium was given to Austria, Holland retaining the privilege of garrisoning the most important fortresses on the French frontier, and also of exercising a monopoly of the navigation of the Scheldt. The Belgian Commercial Company at Ostend, founded by Charles VI. in 1722, fell in 1731—another sacrifice to the cupidity of Holland. During the War of the Austrian Succession (1744), almost the whole country fell into the hands of the French, but was peaceably restored to Austria by the Treaty of Aix-la-Chapelle (1748).

Belgium remained undisturbed by the Seven Years' War, and during the long peace following the Treaty of Aix-la-Chapelle prosperity was restored. Especially during the mild reign of Maria Theresa of Austria, measures of public improvement were promoted by Prince Charles of Lorraine, Governor of the Belgian provinces. Joseph II., son and successor of Maria Theresa, sought to obliterate the line which William of Orange and Marlborough had drawn with so much pains between the Dutch Netherlands and the Austrian Provinces. He compelled Holland to consent to the abolition of the barrier contract, and in consequence the Dutch garrisons were removed and several important fortresses demolished. The Dutch strenuously resisted his attempt to restore the free navigation of the Scheldt, and as France supported them in their resistance the Emperor had to yield. Meanwhile his administrative reforms offended the people of his own provinces. In a short time discontent openly manifested itself. The Austrian authorities were attacked; Brabant refused to pay taxes, while the more violent fled into Holland and organized an armed expedition. In 1787 a Belgian republic was proclaimed; but Leopold II., who succeeded Joseph II. in 1790, suppressed this insurrection, agreeing, however, to a restoration of the old Constitution and privileges. The peace that followed was interrupted by the outbreak of the French Revolution. The Belgian Netherlands were conquered by Pichegru in the campaign of 1794, and ceded to France by the Treaty of Campo Formio. The country shared the fortunes of France during the Consulate and the Empire; received the *Code Napoléon,* and in all political relations was a part of France. After the fall of Napoleon it was united with Holland, and its boundaries defined by the Congress of Vienna (1815).

The union brought into sharp relief the difference between the Dutch Protestant population, with their commercial habits, and the Catholic population of agricultural and manufacturing Belgium. Furthermore, the important provisions of the Constitution had regard chiefly to the interests of Holland. Attempts were made to make Dutch the official language, the privileges of the Belgian clergy were abridged, and the poorer classes were severely taxed, while the Government was almost exclusively composed of Dutchmen. The Liberals and the Catholics both strongly resented the encroachments of Holland; the Liberals, from a desire to preserve the national secular institutions; the Catholics, from a desire to preserve the National Church. When these parties showed signs of coalescing, the Government attempted concessions, which came too late to check the outburst of dissatisfaction; then followed reactionary attempts at coercion and intimidation, which fanned the flame of discontent.

Inspired by the French Revolution of 1830, the Belgians revolted against the Dutch. The rising took place in Brussels, August 25, 1830, and soon spread over all Belgium. Finding that the revolt was spreading in spite of force, King William offered a separate government for the Belgians, and a personal union with Holland. The Belgians rejected this, declared their independence, October 4, organized a Provisional Government, and called a congress, which met in

November and adopted three principles: (1) Belgian independence; (2) hereditary monarchy, with representative institutions; (3) exclusion of the House of Orange. They then proceeded to frame a constitution. The citadel of Antwerp was still held by a Dutch garrison under the intrepid General Chassé. Meanwhile the London Conference of the Powers had assembled to consider this breach of the treaties of 1815, and after mature deliberation recognized the independence of Belgium as a *fait accompli* (December 10). During 1831 the Conference arranged the terms of the separation, and in 1832 Belgium was neutralized and its neutrality was guaranteed by the Concert. Meanwhile the Belgian Congress had elected as King a son of Louis Philippe: but he declined under pressure from England, and after the brief regency of Baron Surlet de Chokier, Prince Leopold (q.v.) of Saxe-Coburg was elected King, June 4, 1831, and subscribed to the Constitution. This prince proved himself a wise monarch. Holland refused to acknowledge the validity of the decision of the London Conference, and sent an army against the Belgians, who were defeated in August, 1831. A French army under Marshal Gérard advanced to arrest the progress of the Dutch. England gave a note of warning, and the Dutch forces were withdrawn. Holland, however, still refused to abide by the decrees of the London Conference, and England and France proceeded to renewed coercion. The coast of the Netherlands was blockaded, and Marshal Gérard laid siege to the citadel of Antwerp. On December 23, 1832, General Chassé surrendered, and the liberation of Belgium was completed. Holland made peace with England and France at London, on May 21, 1833. A definitive settlement between Holland and Belgium was not effected until 1839, when it was agreed that Luxemburg and Limburg should be divided between the two kingdoms.

The government of Belgium was of the parliamentary type, the people, as represented by the electorate, being regarded as the source of power. As soon as independence was achieved and recognized by Europe, the Liberal and Clerical parties, which had united against outside influence, fell into their natural opposition. The Liberals declared the encroachments of the Catholic religion to be "dangerous and continually hostile to civil society." The King studiously avoided organizing a party Ministry, and the Minister of Justice declared that "the division into Catholics and Liberals is without meaning in the presence of the great principles of liberty consecrated by the Constitution." The Education Act of 1842 made moral and religious instruction compulsory in the public schools, and intrusted it to the Church, under Government supersivion. This brought the school question permanently into Belgian politics, where, with the suffrage, it has since held the leading place. The elections of 1847 at last brought to a close the system of government in subservience to the Church. A new Liberal Ministry was formed by Rogier and others, whose programme promised the maintenance of the independent civil authority. The institution of numerous agricultural and commercial schools, normal *ateliers*, popular libraries, and other means used for raising the working class, were followed by most beneficial results. The revolutionary movement which swept over Europe in 1848 menaced the tranquillity of the country, but the King declared himself ready to retain or to surrender the Crown of Belgium, according to the decision of the people. This declaration strengthened the party of order, while it disarmed even those most disaffected to the Crown. Leopold I. died in 1865, and was succeeded by his son, Leopold II., the present sovereign. Leopold II. (q.v.), a shrewd business man, who will be chiefly remembered in history for the support given by him to the International African Association, resulting in the establishment of the Congo Free State (q.v.), of which he was chosen sovereign. By a will executed in 1889, King Leopold bequeaths his new dominions to the Belgian State. In 1890 a convention was entered into by Belgium and the Congo Free State, by which Belgium, in consideration of a subsidy of 25,000,000 francs to the Congo Free State, received the right to annex that country at the end of ten years. This right is still continued under an act of August 10, 1901. The outbreak of the Franco-Prussian War in 1870 threatened the neutrality of Belgian soil, causing something of a panic, which was intensified on the publication, by the Prussian Foreign Office, of a secret proposal made some time previously by Napoleon III. to Prussia, involving the annexation of Belgium to France. But the written assurance of both the French Emperor and the Prussian King, to the effect that Belgian neutrality would be scrupulously respected, served to restore tranquillity; and these personal assurances were formally embodied in a treaty between England, France, and Prussia in the same year.

Protected by its neutrality and governed by kings whose ambition has been to maintain order and a business-like administration, Belgium has prospered and enjoyed tranquillity, disturbed only by the labor and socialistic agitation incidental to Nineteenth-Century life in a manufacturing country with such a dense population. The agitation has taken form politically in the movement for universal suffrage. Before 1870 the Liberals were in power a greater part of the time. After that the pendulum began to swing to the other side, and since 1884 the Catholics, recruited by those whose conservatism feared the radical tendencies of the socialists, have controlled the government. Political strife has centred mainly about the suffrage; in 1890 the agitation for universal suffrage culminated in a monster popular demonstration, which led the Ministry to promise in November of the same year an immediate consideration of the question. The Constitution as revised in 1893 embodies the results of this struggle. The suffrage was conferred on all male Belgian citizens above the age of 25; but to counterbalance this sudden increase in the power of the lower classes, one or two supplementary votes were allowed in certain cases. (See section on GOVERNMENT.) Under this provision, 1,452,232 voters disposed of 2,239,621 votes in the year 1900. Its adoption gave the Catholic party a very large majority. The old Liberal party practically disappeared, the opposition being represented by a radical Socialist party. To regain something of its former power, the Liberal party, aided by the Socialists, instituted an agitation for the establishment of the principle of proportional representation, in accordance with which representation in the Chambers is apportioned among the different political parties in proportion to the number of votes cast by each at the election for deputies. Such a measure was adopted in 1899, and the immediate result was the rise of the Liberal party almost from oblivion to considerable importance.

Bibliography. Belgian nationalists are seeking to unify Belgian history in order to prove Belgium's claims to nationality as against Holland and France. Moke, *Histoire de la Belgique*, with a continuation by E. Hubert (Brussels, 1881), is such an attempt. For the period of independence, consult: Thonissen, *La Belgique sous le règne de Léopold I.*, 4 vols. (Louvain, 1855-58); Hymans, *Histoire parlementaire de Belgique de 1830 à 1880* (Brussels, 1878-80); Laveleye, *Le parti clérical en Belgique* (Leipzig, 1874), written from the Liberal point of view; Woeste, *Vingt ans de polémique* (Brussels, 1885), which is Catholic in its sympathies; and the works of Théodore Juste on the Revolution, its men and its problems.

Among geographical and statistical works, may be mentioned: Leroy, *Géographie générale de la Belgique* (Namur, 1889); Genonseaux, *La Belgique physique, politique, etc.* (Brussels, 1878); Garcia de la Vega, *Royaume de la Belgique* (ib., 1883); Wauters, *La Belgique ancienne et moderne* (ib., 1882, et seq.); Hymans, *La Belgique contemporaine* (Mons, 1884); Penck, "Das Königreich Belgien," in Kirchhoff, *Länderkunde von Europa*, Vol. II. (Leipzig, 1889); Meuriot, "Note sur la statistique agricole de la Belgique," in the *Journal de la Société de Statistique de Paris* (Paris, 1900); Julin, "Le recensement général des industries et des métiers en Belgique au 31 Octobre, 1896," in *La Réforme Sociale*, Vol. IX. (Paris, 1900); Essars, "Banking in Belgium," in *A History of Banking in All the Leading Nations*, Vol. III. (New York, 1896); Nicolai, *Les chemins de fer de l'état en Belgique 1834-84* (Brussels, 1885).

BELGOROD, byĕl′gō-rôt, or **BIELGOROD** (Russ. *byely*, white + *gorod*, city). The capital of a district in the Russian Government of Kursk, situated on the right bank of the Donetz, 87 miles south of Kursk, and 43 miles from Kharkov (Map: Russia, E 4). Belgorod, which derives its name from a neighboring chalk-hill, is divided into two—the old and the new—towns. It is built chiefly of wood, and is an archiepiscopal see. It has manufactures of leather and soap, and agriculture is fairly well developed. There is a considerable trade in wax, apples, tallow candles, and especially of chalk, of which about 1300 tons are produced annually within the city limits. Population, in 1897, 21,800.

BELGRADE, bĕl-grād′ (Serv. *Beograd*, from *bel*, white + *grad*, city, fortress; in Ger. *Weissenburg*, same meaning, anciently *Singidunum*). The capital of Servia, situated at the confluence of the rivers Save and Danube (Map: Turkey in Europe, C 2). It consists of half a dozen distinct quarters. The famous old fortress occupies in part the level ground at the junction of the two rivers, and in part is built on a hill about 150 feet high. The appearance of Belgrade has been greatly modernized during the last decades. One section, known as the English Quarter, has handsome villas and gardens. There are large business houses and hotels, and a number of banks. Hundreds of cabs, as well as a tramway and an electric railway, afford easy means of communication between the different parts of the city. The King's Palace, the Metropolitan Cathedral, the residence of the Metropolitan, the National Theatre, and the public offices are the principal buildings. One of the old mosques is in a good state of preservation. The city has three parks, one of which contains a menagerie and the other an obelisk commemorating the emancipation of the Servians from Turkish rule. At the head of the educational institutions is a royal college with faculties of philosophy, jurisprudence, and engineering. Belgrade is the seat of the Royal Servian Academy of Sciences, to which belongs the National Library, with about 100,000 volumes. The industries of the town are not important, but its commerce is extensive, it being the great entrepôt of the trade between Austria-Hungary and Servia, and the outlet of the products of the kingdom. It exports the raw products of Servia and imports largely manufactured products. The population of Belgrade is increasing rapidly; in 1884 there were 26,600 inhabitants; in 1890, 54,500; in 1895, 59,100; in 1900, 69,097. At the close of the Middle Ages Belgrade was a frontier fortress of Hungary, and in the Turkish wars was a key to that kingdom. It was stormed in 1521 by the Turks, who had attempted to capture the town in 1456, and had been repulsed with great loss by John Hunyady and a crusading force. Thrice taken for Austria—in 1688 by the Elector of Bavaria, in 1717 by Prince Eugène (after a brilliant victory over the Turks), and in 1789 by General Loudon—it was restored each time, by treaty, to the Turks. Though Servia became practically independent in the early part of the Nineteenth Century, the Turkish garrison was not withdrawn till 1867.

BELGRAND, bĕl′grăN′, Marie François Eugène (1810-78). A French civil engineer, born at Ervy (Aube). He studied at the Ecole Polytechnique and the Ecole des Ponts et Chaussées, became in 1852 a chief engineer, and in 1875 an inspector-general of the first class. He designed the water-supply and sewerage systems of Paris, two mammoth works of engineering. His publications include *Les travaux souterrains de Paris*, *Les eaux anciennes de Paris*, and other volumes.

BEL′GRAVE SQUARE. One of the largest and most fashionable residence squares of London, lying west of the Green Park and south of Hyde Park, and built in the early part of the Nineteenth Century. It was named from Belgrave, in Leicestershire, a property belonging to the Duke of Westminster.

BELGRA′VIA. The fashionable residence district in London, built up south and west of Belgrave Square. In the early part of the Nineteenth Century it was a marshy farm, which was filled in and drained about 1825. Consult Hare, *Walks in London* (London, 1883).

BELIAL, bē′lĭ-*a*l *or* bēl′y*a*l. A Hebrew term occurring twenty-seven times in the Old Testament, and generally taken to mean 'wicked' or 'worthless,' both in the moral and material sense. It occurs very frequently in the Bible in the phrase 'sons of Belial' (I. Kings xxi. 10, 13; II. Chron. xiii. 7; Deut. xiii. 13), and however we may account for it, Belial was personified and became a designation of the arch-demon Satan (II. Cor. vi. 15). The etymology which until recently was current, dividing the word into two parts, *beli*, 'without,' and *yaal*, 'worth,' is to be rejected. It has been satisfactorily shown by Cheyne (*Expositor*, 1895, pp. 435-439) that the word *belial* is used in the Old Testament in three senses: (1) great wickedness; (2) hopeless ruin; and (3) subterranean watery abyss (Ps. xviii. 4). In view of this third meaning Cheyne proposes to connect Belial with Belili, a goddess of the underworld in Babylonian mythology. There is much to be said in favor of this view, though of course we must assume that the term, after coming to the Hebrews, was developed (as were the other mythological terms of foreign origin) in a manner that in the course of time separated it from its Babylonian prototype.

BELIANIS (bā'lē-ä'nēs) **OF GREECE.** A continuation of *Amadis of Gaul*, by Jeronimo Fernandez (1547). It was translated from the Spanish into Italian in 1586, into English in 1598, and into French in 1625. It was one of the books in Don Quixote's library, and was censured there by the 'curé' for its masses of extrinsic detail. Another English version appeared in 1673.

BÉLIDOR, bā'lē'dôr', Bernard Forest de (c.1698-1761). A French military engineer, born in Catalonia. He was the inventor of military mining, and continues an authority on subjects connected with hydraulic architecture and artillery. He published *Sommaire d'un cours d'architecture militaire, civile et hydraulique* (1720); *Traité des fortifications* (1735), and other works.

BELIEF' (the verb *believe*, AS. *gelýfan*, Goth. *galaubjan*, Ger. *glauben*, literally means to esteem dear, to value; cf. E. *lief*, Goth. *liubs*, dear, Lat. *libet*, *lubet*, it pleases, Ger. *Liebe*, love). In discussing the subject of Belief, the psychologist has to distinguish sharply between two related questions: that of the composition of the believing or assenting consciousness, and that of the nature of belief as an attitude or function of mind at large. Under the former head (1) we find the most diverse views prevailing in the different psychological systems. Locke (1632-1704), James Mill (1773-1836), and Herbert Spencer offer a purely intellectualistic analysis. For Locke, belief is an association of ideas on the ground of probability. If the association corresponds to a natural connection among the objects of idea, the belief is right; otherwise, it is wrong. The reasons for erroneous assent are to be found in want of proofs; want of ability or will to use them; and wrong measures of probability (reliance on authority, yielding to passion). Mill declares, in similar vein, that in every instance of belief there is an indissoluble association of ideas. "I never have a sensation, nor the idea of that sensation, without associating with it the idea of myself. . . . In the case of a present sensation, and that of a present idea, the sensation and the belief in the sensation, the idea and the belief in the idea, are not two things; they are, in each case, one and the same thing." Those psychologists who deem these analyses defective have pointed out that while belief always implies the presence in consciousness of ideational material, the object of belief, it is rather a feature of the emotional and volitional than of the purely intellectual life. This fact is recognized by Bagehot, when he speaks of the "emotion of conviction"; by James, when he defines belief as "a sort of feeling more allied to the emotions than to anything else"; and by Bain, who, postulating a primitive tendency to credulity as he postulates a primitive tendency to spontaneous movement, describes belief as "in its essential character a phase of our active nature, otherwise called the will." When we remember how close is the connection between emotion and volition ("the emotion itself, together with its result, is a volitional process": Wundt), we see that it is a matter of comparative indifference whether the affective or the voluntary aspect of belief receives emphasis in the definition; the important thing is to avoid the intellectualistic fallacy of the associationist school.

(2) *The nature of belief as an attitude or function of the mind at large.*—That belief can be envisaged, not as a complex of conscious processes, but as a state of consciousness (see Attention), appears in Hume's (1711-76) account of it. "Belief is nothing but a more vivid, lively, forcible, firm, steady conception of an object than the imagination alone is ever able to attain. It consists . . . in the manner of the conception [of the ideas] and in their feeling to the mind. . . . It gives them more weight and influence; makes them appear of greater importance; enforces them in the mind." Hume does not profess "perfectly to explain" this mode of conception. He is followed by J. S. Mill, who asserts that the difference between "thinking of a reality and representing to ourselves an imaginary picture" is "ultimate and primordial"; and by Brentano, who makes 'judgment' one of the elementary conscious functions. Without questioning the uniqueness of the state of assent, we may say, in general, that belief is a state of attention, with extreme liability of suggestion in a given direction.

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BEL INCONNU, bĕl äɴ'kô'nụ', Le (Fr., the Fair Unknown). A fair young knight of unknown parentage, who King Arthur decreed should be thus surnamed. He appears in a secondary Round-Table legend of the same name, written by Renauld de Beaujeu.

BELIN'DA. See Edgeworth, Maria.

BELINE, bā'lēn'. A character in *Le malade imaginaire*, by Molière. She is the wife of Argan, who craftily discovers that her protestations of love are false.

BELISAIRE, bā'lē'sâr'. (1) The title of a tragedy by Rotrou (1643). (2) The name of a political romance by Marmontel (1767). In it the author attacks the spirit of religious intolerance then prevailing, and raises a tempest of indignant outcries. The work was declared blasphemous, and all Paris was intensely excited over it.

BELISARIO, bā'lē-zä'rē-ō. The title of an opera by Donizetti, first given in Venice (1836).

BEL'ISA'RIUS (Slav. *byelŭ*, white + *tsar*, prince, czar) (c.505-565). An heroic and loyal Byzantine general, to whom the Emperor Justinian was indebted for many of his victories. He was born in Illyria, and first attained celebrity as the commander of the Eastern army of the Empire, stationed on the confines of Persia, where in A.D. 530 he gained a victory over a Persian army nearly twice as large as his own. The historian Procopius was at this time secretary of Belisarius. In the following year Belisarius was compelled by the impatience of his troops to offer battle at Callinicum, a town at the junction of the rivers Bilecha and Euphrates; he was defeated, and in consequence recalled. He nevertheless remained faithful to his sovereign, and rendered him great service in Constantinople, where the strife of 'the Greens' and 'the Blues' had endangered the authority and even the life of Justinian. Already a new emperor, Hypatius, had been elected, when Belisarius, at the head of the Life Guards, attacked and slew in the racecourse 30,000 of the rioters and restored tranquillity. Previous to this he had married a wealthy but profligate lady, Antonina, whom he loved with blind uxoriousness. In A.D. 534 Belisarius was sent, with an army of 15,000 men, to recover the Province of Africa held by the Vandal King, Gelimer. Belisarius gained two victories, made the King a prisoner, seized his treasures, and brought him to Constantinople, conquering on the way Sardinia and the Balearic Isles. Medals were struck in Belisarius's honor, and in March, 535, he was invested with the dignity of Consul, and was granted the distinction of a double triumph, according to the old Republican custom.

Belisarius was not idle long. The divisions existing in the royal family of the Ostrogoths induced Justinian to attempt to wrest Italy from their hands. In 535 Belisarius conquered Sicily, and in the autumn of 536 he crossed over to Lower Italy, where all the cities submitted to him except Naples, which he carried by storm. On December 10 he entered Rome, and held it for a year against the Goths, until the enemy raised the siege. In 538 Narses was dispatched with reinforcements for the army in Italy; but some misunderstanding occurred between the two generals, and they failed to relieve Milan, which in 539 was sacked by Braias, nephew of the Gothic King, Vitiges. Narses was recalled from Italy, and Belisarius was placed at the head of both armies. Refusing his assent to a treaty proposed to King Vitiges by Justinian's ambassadors, he drove the Goths back to Ravenna, which he captured in 540, together with Vitiges himself. But before he could complete his conquest of the Goths, he was recalled by Justinian to Constantinople. In 541-42 he was engaged in a campaign against the Persians, who had captured Antioch; but he was again superseded, on account of the slanderous representations made to the Emperor by his own wife, Antonina. His second great struggle with the Ostrogoths now began. In 545 the barbarians, under Totila, had again invaded and reconquered Italy. Belisarius was sent against them, but with an insufficient army. He, however, maintained his ground for three years, harassing the enemy by his skillful movements, and succeeded in regaining possession of Rome; but in spite of his repeated entreaties, no reinforcements were sent to him, and in September, 548, he gave up the command. His rival, Narses, was appointed in his place.

After ten years of retirement, Belisarius once more came forward, at the head of an army hastily collected, and overthrew the Bulgarians, who threatened Constantinople. Toward the end of his life this faithful servant, who at Ravenna had refused the crown of Italy offered to him by the Goths, was accused of a conspiracy against Justinian, and imprisoned, December, 563; but, according to Malala and Theophanes, Justinian became convinced of his innocence, and restored him, after seven months, to all his honors. He died March, 565.

The life of Belisarius has been treated with great license by writers of fiction, especially by Marmontel, who represented the hero as cruelly deprived of sight, and reduced to begging for his bread in the streets of Constantinople. Tzetzes, a writer of the Twelfth Century, states that during his half-year's imprisonment Belisarius suspended a bag from the window of his cell and exclaimed to those who passed by: "Give an obolus to Belisarius, who rose by merit and was cast down by envy:" but no writer contemporary with Belisarius mentions this circumstance. Lord Mahon, in his life of Belisarius (London, 1829), endeavors, but without success, to confirm the tradition, or rather the fiction, of Belisarius's having been deprived of sight and reduced to mendicancy. This fiction supplies the subject of a fine picture by the French painter Gérard. The works of Procopius are the most important original sources for the life of Belisarius. For secondary works, consult: Bury, *Later Roman Empire* (London, 1893); Hodgkin, *Italy and Her Invaders* (Oxford, 1880-85).

BÉLISE, bå'lėz'. A vain character in *Les femmes savantes*, by Molière. She is Philaminte's sister, and tries to win Henriette's lover.

BELIZE, be-lēz'. The capital and chief seaport of the colony of British Honduras (q.v.), in Central America (Map: Central America, C 2). It is situated at the mouth of the Belize River, but the usefulness of its port is greatly impaired by sand-bars. Ocean-going vessels are obliged to load and unload by means of lighters. The town is well built and has considerable trade. Population, about 7000.

BELKINE, byĕl'kēn, IVAN. The pseudonym of the Russian poet Pushkin.

BELKNAP, bĕl'năp, GEORGE EUGENE (1832-1903). An American naval officer, retired in 1894. He was born in New Hampshire. In 1847 he entered the navy as a midshipman. From 1856 to 1858 he served in the East Indies, and commanded a launch before the Barrier Forts on the Canton River, China, in 1856. In the Civil War he commanded the *New Ironsides* during the bombardment of the forts and batteries in Charleston Harbor, and led the attack at the capture of Fort Fisher, N. C. In 1874, as commander of the *Tuscarora*, he was engaged in making deep-sea soundings between the United States and Japan, to determine the possibility of laying a submarine cable across the Pacific, and invented an apparatus for securing specimens of soil from the ocean bed which is now used in both the naval service and the coast survey. He was appointed superintendent of the United States Naval Observatory in 1885, and became a rear-admiral in 1889.

BELKNAP, Jeremy (1744-98). An American Congregational minister, born in Boston, and pastor at Dover, N. H., and at Boston. He was a graduate of Harvard (1762), and in 1791 founded the Massachusetts Historical Society. Among his works are a painstaking and readable *History of New Hampshire* (1792); *American Biography* (1798); *The Foresters: An American Tale* (1796); and a *Collection of Psalms and Hymns* (1795). He devoted much of his life to historical and biographical research. His *Life*, with parts of his correspondence, appeared in New York, 1847.

BELKNAP, William Worth (1829-90). An American soldier. He was born at Newburgh, N. Y., graduated at Princeton in 1848, and settled as a lawyer in Keokuk, Iowa. He entered the Union Army as major of volunteers, 1861; distinguished himself in Sherman's Atlanta campaign, and was brevetted major-general in 1865. He was Secretary of War under President Grant from 1869 to 1876, and in the latter year was impeached on charges of corruption; but resigned before the proceedings could be formally begun, so that this charge was dropped on the ground of lack of jurisdiction.

BELL (perhaps connected in origin with *bell*, *bellow*, to roar). A hollow, cup-shaped, metallic percussion instrument, suspended by a neck and sounded by a swinging clapper, or a hollow metallic sphere sounded by a loose ball in its interior. From a remote antiquity, cymbals and hand-bells were used in religious ceremonies. In Egypt it is certain that the feast of Osiris was announced by ringing bells; the Jewish high-priests wore golden bells attached to their vestments, and in Athens the priests of Cybele used bells in their rites. The Greeks employed them (*koda*) in camps and garrison; and the Romans announced the hour of bathing and of business by the *tintinnabulum*. The introduction of bells into Christian churches is usually ascribed to Paulinus, Bishop of Nola, in Campania (A.D. 353-431); but there is no evidence of their existence for a century later. That they were first made in Campania, is inferred from the name given to them—*campanæ*; hence, *campanile*, the bell-tower. Their use in churches and monasteries soon spread through Christendom. They were introduced into Gaul about 500; and Benedict, Abbot of Wearmouth, brought one from Italy for his church about 680. Pope Sabinian (600) ordained that every hour should be announced by sound of bell, that the people might be warned of the approach of the canonical hours (q.v.). Bells came into use in the East in the Ninth Century, and in Switzerland and Germany in the Eleventh Century. Most of the bells first used in Western Christendom seem to have been hand-bells. Several examples, some of them, it is believed, as old as the Sixth Century, are still preserved in Ireland, Scotland, and Wales. They are made of thin plates of hammered iron, bent into a four-sided form, fastened with rivets, and brazed or bronzed. Perhaps the most remarkable is that which is still preserved at Belfast, and said to have belonged to Saint Patrick, called the *Clog-an-eadhachta Phatraic*, or 'the bell of Patrick's Will.' It is 6 inches high, 5 inches broad, and 4 inches deep, and is kept in a case or shrine of brass, enriched with gems and with gold and silver filigree, and made (as an inscription in Irish shows) between the years 1091 and 1105. The bell itself is believed to be mentioned in the *Annals of Ulster* as early as the year 552. The four-sided bell of Saint Gall, an Irish missionary, who died about 646, is still shown in the monastery of the city which bears his name in Switzerland. Church-bells were suspended either in the steeples or church-towers, or in special bell-towers. They were long of comparatively small size; the bell which a king presented to the Church of Orleans in the Eleventh Century, and which was remarkable in its age, weighed only 2600 pounds. In the Thirteenth Century much larger bells began to be cast, but it was not until the Fifteenth Century that they reached really considerable dimensions. The bell 'Jacqueline,' of Paris, cast in 1400, weighed 15,000 pounds; another Paris bell, cast in 1472, weighed 25,000 pounds; the famous bell of Rouen, cast in 1501, weighed 36,364 pounds. The largest bell in the world is the great bell of Moscow, cast in 1733, it being 21 feet high, 21 feet in diameter, and weighing 432,000 pounds. This bell, in 1737, was injured by a fire and remained partly buried in the earth until 1837, when it was raised, and now forms the dome of a chapel formed by excavating the earth beneath it. Among other large bells are: another at Moscow, cast in 1819, and weighing 127,830 pounds; the great bell of Burma, 12 feet high, 16¼ feet in diameter, weighing 260,000 pounds; the great bell at Peking, 14 feet high, 13 feet in diameter, and weighing 130,000 pounds; those at Novgorod, Russia, 62,000 pounds; Olmütz, Rouen, and Vienna, each weighing about 40,000 pounds; Houses of Parliament, London, 30,000 pounds; New York City Hall, 23,000 pounds; Montreal Cathedral, 28,560 pounds; Notre Dame, Paris, 28,672 pounds; Saint Peter's, Rome, 18,600 pounds; Saint Paul's, London, 11,470 pounds.

The art of casting bells seems to have made little advance as the result of modern inventions, it being impossible to make better bells to-day than were made three or four hundred years ago. The material used in making bells is a kind of bronze known as bell-metal (see Alloys), which is an alloy of copper and tin. Authorities differ as to the best proportions of the copper and tin. Some give 80 parts of copper to 20 of tin, or 4 to 1; others state the proportions as being 3 to 1. In the reign of Henry III. of England, it would seem to have been 2 to 1; and the small bronze bells discovered by Layard in the palace of Nimrud are found to contain 10 of copper to 1 of tin. Hand-bells are often made of brass, antimony alloyed with tin, German silver, real silver, and gold. The notion that in old times silver was mixed with bell-metal to sweeten the tone is a mistake. Silver, in any quantity, would injure the tone. The quality of a bell depends not only on the composition of the metal it is made of, but very much also on its shape, and on the proportions between its height, width, and thickness, for which the bell-founder has rules derived from experience and confirmed by science. The pitch of a bell is higher the smaller it is. For a peal of four bells to give the pure chord of ground tone (key-note), third, fifth, and octave, the diameters require to be as 30, 24, 20, 15, and the weights as 80, 41, 24, 10. A smaller quantity of metal than is due to the calibre of the bell, though giving the same note, produces a meagre, harsh sound; and the real or fancied superiority in dignity of tone of some old bells is ascribed to a greater weight of metal having been allowed for the same note than modern economy would dictate. Bells have been cast of steel, some of which have had a tone nearly equal in fineness to that of the best bell-metal, but deficient in duration, having less vibration. Some have also been cast of glass, with a considerable thickness of the material; and these give an extremely fine sound, but are too brittle to stand the continued use of the clapper.

The manufacture of bells is simply a process of founding. A core is first constructed of brickwork, which is covered with layers of clay which, by means of a template, is formed to the exact form and dimensions of the interior of the bell to be cast. On this mold is laid a 'model' of earth and hair, which is the exact counterpart of the future bell. A third and heavy shell is then built over the model, which, when completed, is lifted, and the 'model' is broken away from the core, and the outside shell is then replaced, leaving a space between it and the core the exact size and shape of the 'model.' Into this space the molten bell-metal is run and allowed to cool.

From old usage, bells are intimately connected with the services of the Christian Church, and thus have acquired a kind of sacred character. They were founded with religious ceremonies, and consecrated by a complete baptismal service; received names, had sponsors, were sprinkled with water, anointed, and finally covered with the white garment of chrisom, like infants. This usage is as old as the time of Alcuin (735-804) and is still practiced in Roman Catholic countries. Bells had mostly pious inscriptions, often indicative of the widespread belief in the mysterious virtue of their sound. They were believed to disperse storms and pestilence, drive away enemies, extinguish fire, etc. A common inscription in the Middle Ages was:

> Funera plango, fulgura frango, Sabbata pango,
> Excito lentos, dissipo ventos, paco cruentos.

Church bells were at one time tolled for those passing out of the world. It was a prevailing superstition that bells had the power to terrify evil spirits, no less than to dispel storms; and the custom of ringing what was called the *passing-bell* "grew (vide *Quarterly Review*, September, 1854) out of the belief that devils troubled the expiring patient, and lay in wait to afflict the soul the moment when it escaped from the body. . . . The tolling of the passing-bell was retained at the Reformation; and the people were instructed that its use was to admonish the living, and excite them to pray for the dying." But "by the beginning of the Eighteenth Century the passing-bell, in the proper sense of the term, had almost ceased to be heard. The tolling, indeed, continued in the old fashion; but it took place after the death, instead of before." The practice of slowly and solemnly tolling church bells at deaths, or while funerals are being conducted, is still maintained as a mark of respect for the deceased. The *pardon-bell* of pre-Reformation England was tolled before and after divine service, to call the worshipers to a preparatory prayer to the Virgin Mary before engaging in the solemnity, and an invocation for pardon at its close. Bishop Burnet has recorded the order of a bishop of Salisbury, in 1538, concerning the discontinuance of the custom. It runs thus: "That the bell called the pardon or ave bell, which of longe tyme hathe been used to be tolled three tymes after and before divine service, be not hereafter in any part of my diocesse any more tollyd."

The ringing of the *curfew-bell*, supposed to have been introduced into England by William the Conqueror, was a custom of a civil or political nature, and only strictly observed till the end of the reign of William Rufus. Its object was to warn the public to extinguish their fires and lights at eight o'clock in the evening. The eight-o'clock ringing is still continued in parts of England and Scotland.

The hanging of bells in dwelling-houses, and ringing them by means of wires from the different apartments, is a comparatively modern invention; for it was not known in England in the reign of Queen Anne. The form of bell now most commonly used for houses and for call-bells in hotels, business houses, etc., is the electric bell. The arrangement required to ring a bell or system of bells by electricity is simple. Some form of galvanic battery requiring little attention is placed in any convenient corner, and from it an insulated wire, with the necessary branches, is conducted to the various rooms; thence to, perhaps, as many bells, and finally back to the battery to complete the circuit. Each single bell is provided with a clapper, to which is fixed a piece of soft iron. Near this is an electro-magnet, wound with a quantity of insulated wire, to which the main wire is connected, so that upon the passage of the signal current the magnet attracts the piece of iron fastened to the clapper, and the clapper strikes the bell. In this way any number of bells may be rung at once by sending a powerful current through the wire to which they are all connected. Such arrangements of bells are used very extensively for giving signals simultaneously in a number of rooms or buildings—for example, for striking the hours in all of the rooms of a school-building; for sounding alarms of fire throughout hotels or large buildings, etc.

Bells for continuous vibratory ringing are of the same construction as those just described, excepting that they are provided with a device for continuously vibrating the clapper while the bell is being rung. The wire, instead of being connected directly to the coil around the magnet, is connected to a post, against which the clapper rests after striking the bell. The coil is connected to the clapper, and the current passes through the post, and the clapper to the coil. When a signal on the wire causes the magnet to attract the clapper and strike the bell the connection is immediately severed by the clapper leaving the post, and no more current can pass until the clapper has returned after striking the bell. Instantly when this occurs the connection is reëstablished, the clapper reattracted, and the bell again struck. Thus a continuous ringing is produced as long as the person presses the calling-button. This push-button is simply an ornamental cap covering the terminals of the wires leading to the bells. A slight pressure of the hand upon the button in the centre forces the spring-shaped terminals of the wires into contact with each other, and allows the current to pass from the battery to the bell.

Consult: Gatty, *The Bell: Its Origin and Uses* (London, 1848); Andrews, *History of Bells* (Paisley, 1885); Lukis, *An Account of Church Bells and Their Founders* (Cambridge, 1857); Briscoe, *Curiosities of the Belfry* (London, 1883); Otte, *Glockenkunde* (Leipzig, 1884); Tyack, *A Book About Bells* (London, 1899). See BELL-RINGING.

BELL, SONG OF THE (Lied von der Glocke). The best-known poem of Schiller, published in the *Musenalmanach* for 1800. In this poem the operations of casting the bell are correlated with the most important events in the whole course of human life. It is the highest development of Schiller's non-dramatic poetry, perfect in form, and embodying a very broad range of sentiment and conceptions.

BELL, THE. (1) An inn at Edmonton, near London, noted in Cowper's ballad of John Gilpin, and as a resort of Charles Lamb. (2) An inn in Warwick Lane, London, the place of Archbishop Leighton's death in 1684.

BELL, ACTON. The pen-name of Anne Brontë.

BELL, ALEXANDER GRAHAM (1847—). An American inventor and scientist, distinguished for his invention of the telephone. He was born in Edinburgh, Scotland, the son of Alexander Melville Bell, who was the inventor of 'visible speech.' He received his education in Edinburgh and at London University, and in 1870, with his father, removed to Canada. He was greatly interested in his father's system of instruction of the deaf and dumb, and in 1872 he became professor of vocal physiology in Boston University. Soon thereafter he began experiments which led to the invention of the speaking telephone (q.v.), and for this, on February 14, 1876, he received a patent. Though his claims were opposed by other inventors, his rights to the invention were sustained by the United States Supreme Court, and he is now considered entitled to the credit of being the first to construct the instrument in a practical shape. In an imperfect form the telephone was exhibited at the Centennial Exposition of 1876, and was carefully studied by scientists from abroad. Further experiments led to the improvement of the apparatus, and a company was organized for its development. From this company, which has enjoyed an almost absolute monopoly of the telephone business in the United States, Professor Bell has received large royalties and dividends. He was also the inventor of the photophone, used for the transmission and reproduction of sounds by waves of light, and of the graphophone, an instrument which mechanically reproduces human speech. He has been active in scientific investigation. He has always maintained his interest in the instruction of deaf-mutes, and has carried on and published important researches in this field, many of which have been published by the Volta Bureau, of which he was the founder. He was elected a member of the National Academy of Sciences in 1883, and in 1881 he received the Volta Prize from the French Government. He has served as president of the American Association to Promote Teaching of Speech to the Deaf, as president of the National Geographic Society, and as a regent of the Smithsonian Institution.

BELL, ALEXANDER MELVILLE (1819—). A Scottish-American educator, born in Edinburgh. From 1843 to 1865 he was a lecturer at Edinburgh University, and in the latter year became lecturer at the University of London. Subsequently he became an instructor in Queen's College, Kingston, Canada, whence, in 1881, he removed to Washington, D. C. He is best known as the inventor of so-called 'visible speech,' a system of instruction very successfully used in teaching deaf-mutes to speak. His publications include *Principles of Speech and Elocution* (1849), and several other works on orthoëpy.

BELL, ANDREW (1753-1832). A Scottish educational reformer. He was born at Saint Andrews, and was educated at the university there. From 1774 to 1781 he lived as a tutor in Virginia, but returned to Great Britain, and took orders in the Church of England. In 1787 he went to India, where he obtained within two years appointments to no less than eight army chaplainships. While at Madras, in 1789, he was intrusted with the management of an institution founded by the East India Company for the education of the orphan children of the European military. As he found it impossible to secure properly qualified assistants, he at last resorted to the expedient of conducting the school through the aid of the pupils themselves. Hence originated the far-famed 'Monitorial System' (q.v.). He superintended this institution for seven years, when the state of his health forced him to return to Europe. In 1797 he published a pamphlet entitled *An Experiment in Education, Made at the Male Asylum of Madras*, which attracted little attention until Joseph Lancaster published a tractate on education (1803) recommending the monitorial system and admitting Bell to have been the original inventor of it, an admission which he afterwards retracted. The Church founded the National Society for the Education of the Poor, in 1816, and appointed Bell superintendent. He afterwards became a prebendary of Westminster, and Master of Sherburn Hospital, Durham. He left £120,000 for the purpose of founding various educational institutions in Edinburgh, Glasgow, Leith, Aberdeen, Inverness, Cupar, and Saint Andrews. Consult Meiklejohn, *An Old Educational Reformer* (Edinburgh, 1881).

BELL, Sir CHARLES (1774-1842). A Scottish surgeon, anatomist, and physiologist, well known for his discoveries in connection with the nervous system. He was born in Edinburgh, the son of the Rev. William Bell, of the Episcopal Church. While a mere youth he assisted his brother John in his anatomical lectures and demonstrations. In 1797 he became a member of the Edinburgh College of Surgeons, and soon after was appointed one of the surgeons of the Royal Infirmary. In 1804 he proceeded to London, and for some years lectured with great success on anatomy and surgery at the academy in Great Windmill Street. Admitted, in 1812, a member of the Royal College of Surgeons, London, he was elected one of the surgeons of the Middlesex Hospital, in which institution he delivered clinical lectures, and raised it to the highest repute. To obtain a knowledge of gunshot wounds, he twice relinquished his London engagements—the first time after the battle of Corunna in 1809, when he visited the wounded landed on the southern coasts of England, and housed in Haslar Hospital; the other after the battle of Waterloo, when he repaired to Brussels and was put in charge of a hospital with 300 beds. In 1824 he was appointed senior professor of anatomy and surgery to the Royal College of Surgeons, London, and subsequently a member of the Council. On the establishment of the London University, now University College, in 1826, Bell was placed at the head of the department of medicine. He delivered the general opening lectures in his own section, and followed it by a regular course of characteristic lectures on physiology, but soon resigned and confined himself to his extensive practice, which was chiefly in nervous affections.

In 1829 he was the recipient of the Royal Society's medal for his discoveries in science. In 1831 he was one of the five eminent men in science knighted on the accession of William IV., the others being Sir John Herschel. Sir David Brewster, Sir John Leslie, and Sir James Ivory. In 1836 he was elected professor of surgery in the University of Edinburgh. He was a fellow of the Royal Societies of London and Edinburgh, and a member of some other learned bodies. He was author of various works on surgery and the nervous system, and editor, jointly with Lord Brougham, of Paley's *Evidences of Natural Religion.* Bell was one of the eight distinguished men selected to write the celebrated *Bridgewater Treatises,* his contribution being on *The Hand, Its Mechanism and Vital Endowments, as Evincing Design* (1834). Among his principal works are: *The Anatomy of the Brain Explained in a Series of Engravings* (1802); *A Series of Engravings Explaining the Course of the Nerves* (1804); *Essays on the Anatomy of Expression in Painting* (1806; posthumous edition, much enlarged, entitled *The Anatomy and Philosophy of Expression as Connected with the Fine Arts,* 1844); *A System of Operative Surgery* (1807-09; 2d ed. 1814); *Anatomy of the Brain* (1811), in which he states his discovery that nerves of sensation are distinct from those of motion; *Dissertation on Gunshot Wounds* (1814); *Anatomy and Physiology of the Human Body* (1816); various papers on the nervous system, which originally appeared in the *Philosophical Transactions; Exposition of the Natural System of the Nerves of the Human Body* (1824); *Institutes of Surgery* (1838); *Animal Mechanics,* contributed to the *Library for the Diffusion of Useful Knowledge* (1828); *Nervous System of the Human Body* (1830). Consult *Correspondence of Sir Charles Bell* (London, 1870).

BELL, Currer. The name under which Charlotte Brontë first wrote.

BELL, Ellis. The pen-name of Emily Brontë.

BELL, George Joseph (1770-1843). A Scottish lawyer, brother of Sir Charles Bell. He was born in Edinburgh, and was admitted to the bar in 1791. Acknowledged one of the greatest masters of commercial jurisprudence of his time, and in particular of that department which relates to the laws of bankruptcy, he was in 1822 appointed professor of Scottish law in Edinburgh University, and in 1823 a member of the commission for inquiring into Scottish judicial proceedings. Subsequently he was a member of a commission to examine into and simplify the mode of procedure in the Court of Session. On the report drawn up by Bell was founded the Scottish Judicature Act, prepared by him, which effected many important changes in the forms of process in the superior courts of Scotland. Appointed in 1831 one of the clerks of the Court of Session, he was in 1833 chairman of the royal commission to examine into the state of the law in general. He also prepared a bill for the establishment of a court of bankruptcy in Scotland. His principal work, *Commentaries on the Laws of Scotland, and on the Principles of Mercantile Jurisprudence* (1826, 7th ed. 1870), attained the highest reputation, ranking with the *Institutes* of Lord Stair. He also published *Principles of the Law of Scotland* (1839).

BELL, Henry (1767-1830). A Scottish engineer, who probably introduced steam navigation into Europe. He was born at Torphichen Mill, Linlithgow, and in 1783 was apprenticed to his uncle, a millwright. He was instructed in ship-modeling at Borrowstounness, and completed his knowledge of mechanics at Bell's Hill. Removing to London, he was there employed by the celebrated Rennie. About 1790 he returned to Glasgow, and in 1808 removed to Helensburgh, where he kept the principal inn and devoted himself to mechanical experiments, chiefly with the steam-engine. In January, 1812, a small vessel, called the *Comet,* with an engine constructed by Bell, was launched on the Clyde with success—the first on European waters. A monument has been erected to his memory at Dunglass Point, on the Clyde. See Steam Navigation.

BELL, Henry Glassford (1803-74). A Scottish lawyer and author. He was born in Glasgow, and studied at Edinburgh. In 1828 he founded the *Edinburgh Literary Journal.* He was admitted to the bar in 1832, was appointed sheriff of Lanarkshire in 1838, and in 1867 sheriff-principal. He was a president of the Athenæum, a founder of the Royal Scotch Academy, and a lecturer before the Philosophical Institution. He was considered the best Scottish mercantile lawyer of his time. His publications included a vindication of Mary, Queen of Scots (1830); *Summer and Winter Hours* (1831); *My Old Portfolio* (1832)—both collected by Bell from the *Literary Journal*—and *Romances and Minor Poems* (1866).

BELL, Henry Haywood (1807-68). An American naval officer, born in North Carolina. He entered the navy as midshipman in 1823; was for many years connected with the East India Squadron, and in 1856 commanded a vessel of the squadron which destroyed the barrier forts, near Canton, China. In 1862 he was appointed fleet-captain of the West Gulf Squadron, and took a prominent part in the passage of Forts Saint Philip and Jackson, and the capture of New Orleans. He was, for a time in 1863, in command of the West Gulf Squadron. In 1865 he was assigned to the command of the East India Squadron, and in 1866 was promoted to be rear-admiral. He was drowned at the mouth of the Osaka River, Japan.

BELL, Henry Thomas Mackenzie (1856—). An English poet and critic, born in Liverpool, March 2. He has written several volumes of sincere verse: *The Keeping of the Vow* (1879); *Verses of Varied Life* (1882); *Old Year Leaves* (1883); *Spring's Immortality and Other Poems* (1896); *Pictures of Travel and Other Poems* (1898). In 1900 appeared a collection of his poems, edited by J. J. Nesbitt. Bell has contributed to the periodicals, and has written several notable critical and biographical essays on Victorian authors, as *Charles Whitehead* (1884; new ed., 1894) and *Christina Rossetti* (1898).

BELL, James Montgomery (1837—). An American soldier, born in Williamsburg, Pa. He graduated at Wittenberg College in 1862, entered the Federal Army as first lieutenant of volunteers, and served throughout the Civil War. From 1866 to 1898 he served on the frontier, where he was engaged in suppressing various Indian outbreaks. He participated in the Sioux wars of 1876-81, and the Nez Percés War of 1877, and in July, 1899, became a brigadier-general of volunteers. In October, 1899, he was sent to the Philippine Islands, where in March, 1900, he was placed in command of the Third District of the Department of Southern Luzon, and in April was appointed military governor of the same district.

BELL, John (1691-1780). A Scottish traveler. He was born in Antermony, and was educated for the medical profession. In 1714 he went to Saint Petersburg, and soon afterwards was appointed physician to an embassy from Russia to Persia. In 1719 he was sent to China through Siberia, and in 1737 went on an embassy to Constantinople, where he settled for some years as a merchant. In 1747 he returned to Scotland. His *Travels from Saint Petersburg to Various Parts of Asia* was published at Glasgow in 1763.

BELL, John (1763-1820). Brother of Sir Charles Bell (q.v.). A Scottish surgeon. He was born in Edinburgh, studied under the celebrated Black, Cullen, and Monro *secundus;* and while attending the anatomy classes of Dr. Monro, first conceived the idea of teaching the application of the science of anatomy to practical surgery. He commenced in 1786 lecturing in Edinburgh on surgery and anatomy, and in 1793 published the first volume of his *Anatomy of the Human Body.* In 1797 appeared the second volume, and in 1802 the third. A volume of anatomical drawings by himself, illustrative of the structure of the bones, muscles, and joints, was published in 1794; and another volume, illustrative of the arteries, with drawings by his brother Charles, appeared in 1801. In 1798 Bell passed some weeks at Yarmouth among the seamen of Lord Duncan's fleet wounded at Camperdown, and in 1800 he published a *Memorial Concerning the Present State of Military Surgery.* His *System of the Anatomy of the Human Body,* and his *Discourses on the Nature and Cure of Wounds* (1793-95), were translated into German. A good classical scholar, he was distinguished alike for his great conversational powers and general information. Early in 1816 he was thrown from his horse, and, his health declining, he went to Paris, and thence proceeded to Italy. He died in Rome of dropsy. Besides the works mentioned, he was the author of *The Principles of Surgery* (1801-07; new edition, edited by his brother, Sir Charles Bell, 1826). A posthumous work, entitled *Observations on Italy,* was published (1825) by his widow.

BELL, John (1797-1869). An American statesman. He was born near Nashville, Tenn., graduated at Cumberland College (now Nashville University) in 1814; studied and practiced law, and in 1817 was elected to the State Senate. He served in Congress from 1827 to 1841, for ten years as chairman of the Committee on Indian Affairs; and, though at first a free-trader, he was afterwards won over to protection, and took an active part in the debates upon the tariff. He supported General Jackson in the Presidential campaign of 1832, but in 1834 joined the newly established Whig Party, and was elected as its representative, over James K. Polk, to the Speakership of the House. In 1841 he became a member of President Harrison's Cabinet, as Secretary of War; but, with the rest of the Cabinet, excepting Webster, resigned (September 11) on account of the rupture between President Tyler, who had succeeded Harrison, and the Whig organization. From 1847 to 1859 he was a member of the United States Senate, and as such was prominent for his opposition to the spoliation of Mexico, to the passage of the Kansas-Nebraska Bill, and to the Lecompton Constitution of Kansas; while he actively supported the Compromise of 1850. In 1860 he was nominated for the Presidency by the Constitutional Union Party (q.v.), and in the ensuing election received the electoral votes of Kentucky, Tennessee, and Virginia. At first, though strongly opposed to the policy of 'coercion,' he deprecated secession, and seemed disposed to support President Lincoln; but he soon gave his adherence to the cause of the Confederacy, and advised his State to withdraw from the Union.

BELL, John (1811-95). An English sculptor, remarkable for rejecting the classical antique model, and following nature only in his works. He was born in Norfolk in 1811, and first exhibited at the Royal Academy, London, 1832, a religious group. His works are numerous, and of high and original merit. Bell's statues of Lord Falkland, exhibited in model at Westminster Hall (1847), and Sir Robert Walpole (1854), were commissioned for the new Houses of Parliament. One of his best-known designs is a monument to the Guards who fell in the Crimea, executed in 1858. In decorative art he also distinguished himself. He was one of the sculptors of the Prince Consort Memorial in Kensington Gardens, London, which was unveiled in 1873, his work being the group representing the United States directing progress of America. Bell is the author of a *Freehand Drawing-Book for the Use of Artisans.* He died in 1895.

BELL, Sir Lowthian (1816-1904). An English manufacturer and politician, born at Newcastle-on-Tyne. He was mayor of Newcastle from 1854 to 1862, member of Parliament for Hartlepool from 1875 to 1880, and in 1885 was created a baronet. He was the founder of the Clarence Iron-works, on the Tees, and wrote: *The Chemical Phenomena of Iron-smelting* (1872), and a

Report on the Iron Manufacture of the United States, and a Comparison of It with That of Great Britain (1877).

BELL, Robert (1800-67). An Irish writer. The son of a magistrate, he was born in Cork, January 16, 1800, and when very young obtained an appointment in a Government department in Dublin. He was for a time editor of the Government journal, *The Patriot.* In 1828 he removed to London, and was appointed editor of *The Atlas* newspaper. In 1838, in conjunction with Sir Edward Bulwer Lytton and Dr. Lardner, he started *The Monthly Chronicle,* and afterwards became editor of it. In 1841 he retired from *The Atlas.* For Lardner's Cyclopædia Bell wrote "The History of Russia" (1836-38), and *The Lives of the English Poets* (1839), completed Southey's *Naval History* (1837), left unfinished by the author, and wrote a continuation of Mackintosh's *History of England* (1853). At the London theatres three five-act comedies were produced by him. He was author, also, of a collection of tales, *Hearts and Altars* (1852); a novel, *The Ladder of Gold* (1856); *Life of Canning* (1846); *Outlines of China* (1845); *Memorials of the Civil War,* consisting of the Fairfax Correspondence (1847); and *Wayside Pictures Through France, Belgium, and Holland* (1858). But the work by which he is chiefly remembered is an annotated edition of the English poets (24 vols., 1854-57). He died April 12, 1867.

BELL, Robert (1841—). A Canadian geologist, born in Toronto, Ont. He studied at McGill University, and in 1857 was appointed to the staff of the Canadian Geological Survey, of which he became the senior member and assistant director. Throughout the Dominion he has made very extensive topographical surveys and explorations. He was medical officer and geologist on the *Alert* Expedition to Hudson's Strait and Bay in 1885; in 1888-89 was a member of the commission appointed by the Government of Ontario to report on the mineral resources of the province; and in 1895 surveyed the Noddawai River (emptying into James Bay), the western and chief branch of which was named after him. In addition to this work, he was also, in 1863-67, professor of chemistry and natural sciences in Queen's University (Kingston). He has published upward of 180 papers and reports on scientific subjects.

BELL, Thomas (1792-1880). An English naturalist. He was born at Poole, and died at Selborne. From 1816 to 1861 he lectured on dental surgery and comparative anatomy at Guy's Hospital, London. In 1836 he became professor of zoölogy in King's College, London. He was the author of several works on British animals, especially *History of British Quadrupeds* (London, 1837; revised edition, 1874), and similar works on *Reptiles* (1839) and *Crustacea* (1853). He played an important part in the development of scientific societies in London. At the age of 70 he retired to Selborne, where he issued in 1877 a classic edition of White's *Natural History of Selborne.* His original scientific writings relate chiefly to fossil Chelonia and Crustacea. See *Nature,* Vol. XXI., pages 473, 499 (London, 1880).

BEL'LA, Stefano Della (1610-64). An Italian etcher, born in Florence. He studied in Rome in 1634-37, and went to Paris in 1640, remaining there until 1650, and was commissioned by Cardinal Richelieu to engrave the famous events of the early reign of Louis XIII. He executed upward of 1400 different subjects—battles, sea-pieces, landscapes, and animals, all of which are characterized by freedom and delicacy, and give evidence of high imagination and much careful manipulation. They are also of great value for the knowledge of the history of civilization in the Seventeenth Century. One of his most admired works is a view of the Pont-Neuf, Paris.

BEL'LACOO'LA. A detached Salishan tribe, living upon the Bellacoola River, which empties into Bentinck Arm, about latitude 52° N., British Columbia. Their name is of Kwakiutl origin. Epidemics and diseases introduced by the white men have now reduced the tribe to a few hundred souls.

BEL'LADON'NA (for derivation see below), Dwale, or Deadly Nightshade (*Atropa belladonna*). A plant of the natural order Solanaceæ. It is an herbaceous perennial, growing up every year as a bush, from two to six feet high, with ovate entire leaves, and bell-shaped flowers of a lurid purple color, which are larger than those of the common harebell, stalked and solitary in the axils of the leaves. It produces berries of the size of a middle-sized cherry, which, when ripe, are of a shining black color, and of a sweetish and not nauseous taste, although the whole plant has a disagreeable, heavy smell. All parts of the plant are narcotic and poisonous, and fatal consequences not unfrequently follow from eating its berries. Its roots have sometimes been mistaken for parsnips. The name Belladonna, 'fair lady,' is supposed to have originated in the employment of the juice for staining the skin or from its power of dilating the pupils and giving a glistening appearance to the eyes. The name 'dwale' is thought to be derived from the same root with the French *deuil,* mourning—an allusion to the same qualities that have obtained for the plant the appellation of deadly nightshade. Others assert that it comes from the Anglo-Saxon and is connected with the word dull, on account of its stupefying effects. *Atropa* is from *Atropos,* one of the Fates. The other species of Atropa are South American. Belladonna owes its powerful effect on the animal system to the alkaloid *hyoscyamine* (see Atropine).

BELLADONNA LILY. See Amaryllis.

BELLAGIO, bĕl-lä'jō (It. *bello,* beautiful + *agio,* rest, repose, comfort). A village of the Province of Como, north Italy, celebrated by historians, artists, and novelists. It is at the most beautiful point on Lake Como, where a wooded promontory separates the two arms of the lake (Map: Italy, D 2). It has regular steamboat communication with Como and with Lecco. It contains excellent hotels, beautiful gardens, an English church, and many magnificent villas. Population, in 1901 (commune), 3536.

BELLAIR, bĕl-lâr', Old and Young. Characters in *The Man of Mode, or Sir Fopling Flutter,* a comedy by Etherege.

BELLAIRE. A city in Belmont County, Ohio, on the Ohio River, five miles south of Wheeling,

W. Va., on the Baltimore and Ohio, the Cleveland and Pittsburg Division of the Pennsylvania Company, the Bellaire, Zanesville and Cincinnati, and the Cleveland, Lorain and Wheeling railroads (Map: Ohio, J 5). Here the Baltimore and Ohio Railroad crosses the river on a fine iron bridge. The city has extensive manufactures of glass, steel, enamel, iron, agricultural machines, and nails. It is in a rich agricultural district, where coal, iron, clay, and limestone also are found in abundance. Population, in 1890, 9934; 1900, 9912.

BELLAMIJ, bĕl′lȧ-mī, Jakobus (1757-86). A Dutch poet. He was born at Flushing, and studied theology at Utrecht. He was a distinguished poet, and the revival of Netherlandic literature was due probably to his influence and that of Van Alphen. His principal works include: *Gezangen mijner Jeugd* (published under the pseudonym of Zelandus, 1782; 2d enlarged ed. under the name of Bellamy, 1790); *Vaderlandsche Gezangen* (1785). His most celebrated poem, "Roosje," appeared in the collection entitled *Proeven voor het verstand den smaak en het hart* (1784). A complete edition of his poems was published by Loosjes (1842).

BELLAMONT, bĕl′lȧ-mŏnt, or **BELLOMONT,** Richard Coote, Earl of (1636-1701). A colonial governor of New York, Massachusetts, and New Hampshire, from 1697 to 1701. He became a member of the English Parliament in 1688, and in the same year was prominent as a supporter of William, Prince of Orange, who in 1689 made him Earl of Bellamont and appointed him treasurer and receiver-general to Queen Mary. In 1695 he was appointed Governor of New York, and in 1697 received a commission as Governor of New York, Massachusetts, and New Hampshire, but did not arrive in America until the following year. He was expressly directed to suppress illegal trade and put an end to piracy, and in 1696, with King William's sanction, he organized a company which sent out Captain Kidd (q.v.) against the freebooters. By many, accordingly, Bellamont has been unjustly accused of having connived at Captain Kidd's own piracies, though it was he who finally arrested him and sent him to England for trial. Bellamont's rigid enforcement of the laws, his sympathy with the democratic as opposed to the aristocratic party, and his strict policy with regard to land grants, aroused much opposition among certain classes in New York, though he was very popular in Massachusetts and in New Hampshire. He has been spoken of as "the first actual friend of the people and sympathizer with honest democratic forms of government who administered the affairs of New York under the English Crown." Consult Frederic De Peyster, *The Life and Administration of Richard, Earl of Bellomont* (New York, 1869).

BEL′LAMY, Edward (1850-98). An American journalist and author. He was born at Chicopee Falls, Mass., studied at Union College, and in Germany; in 1871 was admitted to the bar, and in the same year became a member of the staff of the New York *Evening Post*. Subsequently he was a critic and editorial writer for the Springfield (Mass.) *Union*, and with others established at Springfield the *Daily News*. His best-known work is *Looking Backward; or, 2000-1887* (1888), which has had an extraordinary sale, and has been translated into many languages. Although not written for such a purpose, the book was extensively received as a gospel of Socialism, and led to the organization of many Bellamy clubs, and of the Nationalist Party, in the promotion of which Bellamy himself was active as a writer and lecturer. *Equality* (1897), the sequel to *Looking Backward*, is an inferior volume on similar lines. Bellamy further published sociological essays, short stories, and some longer works of fiction, including *Dr. Heidenhoff's Process* (1879); *Miss Ludington's Sister* (1884); and *The Duke of Stockbridge*, the last appearing three years after his death, which occurred on May 22, 1898, at Chicopee Falls. W. D. Howells has declared that in Bellamy America is "rich in a romantic imagination surpassed only by that of Hawthorne."

BELLAMY, George Anne (c.1731-88). An English actress. She was born, by her own account, at Fingal, Ireland. 'George Anne' was a name given by mistake for Georgiana. She was the illegitimate daughter of Lord Tyrawley, and was educated by him. Choosing, however, to live with her mother, she made the acquaintance of Mrs. Woffington and other actors, and was engaged at Covent Garden to play Monimia in *The Orphan* (November, 1744). Her success thereafter was rapid. Her Belvidera, in *Venice Preserved*, and her Desdemona were much admired. She participated in the rivalry for popular favor in *Romeo and Juliet* in 1750, playing with Garrick at Drury Lane, while Barry and Mrs. Cibber played at Covent Garden. She was thought the more charming of the Juliets. Mrs. Bellamy was extremely popular, and until she forfeited her character by her various liaisons, was received in the best society. She lost her beauty early, and her later life was unhappy, apparently through her own extravagance and reckless habits. Her last appearance was at Drury Lane May 24, 1785, in a benefit to herself, in which she was unable to act, but spoke a short address to the spectators. Consult: *An Apology for the Life of George Anne Bellamy, late of Covent Garden Theatre, Written by Herself*, 6 vols. (London, 1785); Matthews and Hutton, *Actors and Actresses of Great Britain and the United States* (New York, 1886); and Galt, *Lives of the Players* (London, 1831).

BELLAMY, Joseph (1719-90). An American theologian, born at New Cheshire, Conn. He graduated at Yale in 1735, was licensed to preach in 1737, and in 1740 became pastor of the Congregational Church of Bethlehem, Conn. He was prominent as an itinerant preacher during the 'great awakening' of 1740-44. Subsequently he established in his parish a noted theological school, in which were trained many distinguished New England divines. As a pulpit orator he was by some esteemed the equal of Whitefield. As a writer he greatly assisted by his scholarship and logic in laying the foundations of what became known as the New England theology. His system of divinity was much like that of his friend and associate, Dr. Jonathan Edwards. He received the degree of doctor of divinity from the University of Aberdeen. His publications include *True Religion Delineated* (1750); *The Nature and Glory of the Gospel* (1762); and *The Law Our Schoolmaster* (1762).

His *Complete Works* were published in 1811 (3 vols.) and 1850 (2 vols., with a memoir by Dr. Tryon Edwards).

BELL AND EV′ERETT PARTY. See Constitutional Union Party.

BELLANGÉ, bĕl′läɴ′zhȧ′, Hippolyte (1800-66). A French painter. He was born in Paris and studied with Gros, and at the Ecole des Beaux-Arts. He first attracted much attention by his painting, "The Return of Napoleon from Elba," exhibited in 1834. From 1837 to 1853 he was director of the museum at Rouen. His principal works, about thirty in number, are chiefly of battle-scenes, and reveal remarkable insight into the human sides of military life as well as a close familiarity with all the details of battle. The following may be cited as examples of his best work: "Battle of Fleurus, 1794" (1836); "Battle of Wagram, 1809" (1837); "Soldier Returning" (1842); "Kellermann's Charge at Marengo, 1800" (1847); "Passage of the Guaddarama" (1852); "Battle of the Alma" (1855); "Assault on Malakoff" (1859); "Two Friends" (1861); "Cuirassiers at Waterloo" (1865); "The Guard Dies," his last work (1866).

BELL AN′IMAL′CULE. See Vorticella.

BELLARIO, bĕl-lä′rė-ȯ. (1) A page in Beaumont and Fletcher's play, *Philaster*, who is in the service of the title-character. Philaster gives this page to his mistress, Arethusa, and later becomes very jealous. His suspicions are dissipated, however, when Bellario turns out to be a woman, Euphrasia, a former love of his. (2) The Paduan lawyer whom Portia pretends to represent in *The Merchant of Venice*.

BELLARMINE, bĕl′lär-mĭn *or* -mēn. The name of a jug devised by the Dutch Protestants in ridicule of Cardinal Bellarmino. Its form was after the churchman's figure, and his face was on it.

BELLARMINE, bĕl′lär-mĭn *or* -mēn. In Italian form, Bellarmino, bĕl′lär-mē′nȯ, Roberto Francesco Romolo. A Roman Catholic theologian. He was born at Monte Pulciano, in Tuscany, October 4, 1542. He entered the Order of Jesuits in 1560, and was distinguished among his confrères by the zeal with which he studied theology, the Church Councils, the Fathers, Hebrew history, and the canon law. In 1563 he gave lessons in polite literature and astronomy at Florence, and in rhetoric at Mondovi, 1564-67. In 1569, when he went to Louvain as professor of theology, he began that long controversy with 'heretics' which formed the main business of his life. From 1576 to 1589 he was professor at the Roman College. Then he went to France, and was in Paris at the time of the siege by Henry IV. In 1591 he was back in Rome and shared in the revision of the Vulgate. In 1592 he became rector of the Roman College. In 1599 he was made a cardinal against his own inclination, and though himself a Jesuit, he honorably sided with the Dominicans against Molina's view in a noted controversy. From 1602 to 1605 he was Archbishop of Capua. After the death of Clement VIII. (1605) he declined promotion to the Papal chair, but was induced by Paul V. to hold an important place in the Vatican, where he remained until the time of his death, which took place in the novitiate-house of the Jesuits, September 17, 1621. In his work, *De Potestate Pontificis in Temporalibus* (On the Pope's Power in Secular Matters), he advocated the doctrine of the spiritual supremacy of the Pope over all kings. On this account the book was condemned as treasonable in Paris, Venice, and Mainz.

His chief work contains the disputations held in the Jesuits' College in Rome, 1576-81, *Disputationes de Controversiis Fidei adversus hujus Temporis Hereticos* (3 vols., Rome, 1581; 4 vols., Prague, 1721; 4 vols., Mainz, 1842). These disputations are regarded by Catholics as the best arguments for their tenets. There can be no question of their merits with regard to erudition and adroitness in controversy; but such Protestant opponents, and he had many of them, as Gerhard, in his *Bellarminus Orthodoxias Testis* (Jena, 1631-33), and Dallæus tried to show that many of the conclusions are far from being sound or logical. Industry, clearness, and acuteness are the chief merits of Bellarmine's great work. He was also conspicuously fair and complete in his statement of his opponents' positions. Among his other writings the most able is the *Christianæ Doctrinæ Applicatio*, originally written in Italian, and now translated into all the European languages. Pope Urban VIII., at the instigation of the Jesuits, declared Bellarmine to be a 'faithful servant of God;' but his canonization as a saint has hitherto been opposed. Curiously enough, his autobiography (Rome, 1675; Louvain, 1753; Ferrara, 1762) stood in the way. The book had become very scarce when J. I. von Döllinger and F. H. Reusch reprinted it, *Die Selbstbiographie des Kardinals Bellarmin, lateinisch und deutsch, mit geschichtlichen Erläuterungen* (Bonn, 1887). Among his famous controversies were those with James I. of England and the Scotch jurist William Barclay, of Aberdeen. His works, edited by Justin Fèvre, were published in Paris (1873-74, 12 vols.). Some of his writings have been translated into English, e.g. *The Seven Words from the Cross* (London, 1870). For his biography, consult J. B. Couderc (Paris, 1893).

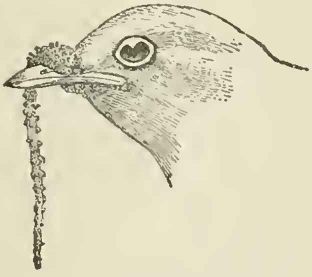
BELLARY, bel-lä′rē, or **BALLARI.** The capital of the district of the same name in India, 380 miles southeast of Bombay, and 270 miles northwest of Madras, in latitude 15° 8′ N. and longitude 76° 59′ E. It is an important junction of the railroads to Bombay and Goa, and is one of the principal military stations in the Presidency of Madras; it is connected by good roads with Belgaum, Bangalore, Hyderabad, and Madras (Map: India, C 5). The fort, dating from the Sixteenth Century, stands on a rock 2 miles round and 450 feet high, and is supplied with water from tanks excavated in the solid granite. Besides the fort and adjacent cantonment, Bellary includes a native town with fine bazars. It has a considerable trade in cotton. Population, in 1891, 59,500; in 1901, 57,700.

BEL′LASTON, Lady. A character in Fielding's novel, *Tom Jones*. She is the mistress of the hero, and for some time supports him.

BELLAVITIS, bĕl′lȧ-vē′tĭs, Count Giusto (1803-80). An Italian mathematician. He was born at Bassano, near Padua, and was for years professor of mathematical analysis at Padua. He contributed extensively to modern geometry, and is especially known for his work in projective geometry and his method of equipollence. His published works include text-books of descriptive geometry (Padua, 1851; ed. 2, 1868); analytical geometry (Padua, 1870); and other valuable treatises.

BELLAY, be-lā′, Joachim du (c. 1524-60). A French poet, member of the Pléiade (q.v.); known as 'The French Ovid.' He was a cousin of Cardinal du Bellay, born in Paris of noble family, but poor and self-educated. His friendship with Ronsard dates from 1548, and led to his *La défense et l'illustration de la langue française* (1549)—an admirable piece of literary criticism, followed by a collection (*Recueil*) of poems and another (*L'Olive*) of love-sonnets (1550). He went with Cardinal du Bellay to Italy (1550), published a translation of two books of the *Æneid* (1552), returned after a mysterious love affair, in 1555, to Paris, where he became Canon of Notre Dame, went to Venice, published poems, Latin and French (*Les antiquités de Rome*), in 1558, and his best collection, *Les regrets* (1559). He died as Archbishop-designate of Bordeaux while preparing *Les jeux rustiques* for the press, at the height of advancing powers. In sublimity and pathos he is first in the Pléiade. Spenser translated sixty of his Roman sonnets into English (1591). The best edition of Bellay is by Marty-Laveaux (2 vols., 1866). Bellay's *Lettres* are edited by Nolhac (1883). There is a *Life* by Seche (1880). Consult: Pater, *Studies in the History of the Renaissance* (London, 1888); Seche, *Œuvres choisies avec notes* (Paris, 1894). A statue of Bellay was unveiled at Ancenis in 1894, with noteworthy addresses by Hérédia and Brunetière.

BELL′BIRD′. The English name of various tropical birds whose voices suggest the tones of a bell; specifically, a chatterer (family Cotingidæ), called campanero by Spanish-speaking people of the Lower Amazon and the Guianas, where it lives, and *Chasmorhynchus niveus* by ornithologists. It resembles the waxwings (Ampelidæ) in form, but is pure white, and feeds mainly upon forest fruits gathered mostly in the high tree-tops, where small flocks move about all day, but are by no means common; and at midday, when most other birds of the forest are silent, its note rings out "loud and clear like the sound of a bell. . . . You hear his toll, and then a pause for a minute, then another toll, and then a pause again, and then another toll, and so on." So Waterton described it: others have likened the sound to blows upon an anvil, but all agree that it can be heard at an immense distance and is very striking. Another remarkable feature of this bird and its relatives, several of which live in South and Central America, and have more or less bell-like voices, are the fleshy appendages (caruncles) about the face, especially conspicuous in the present species. From its forehead depends a slender caruncle (see illustration), jet black but dotted all over with starlike tufts of feathers. It was long believed that this caruncle was concerned in the singular voice of the bird, because Charles Waterton (*Wanderings in South America*, London, 1825) asserted that it could be inflated from the palate, and would stand erect like a rigid spire above the beak to the height of 3 inches. This seemed plausible, but has been proved erroneous by observation upon birds kept in captivity, particularly about 1891 by J. J. Quelch, a naturalist of Georgetown, British Guiana.



AMAZONIAN BELLBIRD.
Showing the Caruncle.

"The caruncle," he says (*The Field*, London, November 26, 1892), "is never carried upright. The erect position, in fact, is an impossible one, since the organ is made up of very fine elastic tissue, which causes it to depend lower and lower over one side of the beak during extension. When the bird is about to utter its characteristic notes, it slowly becomes elongated, at times as much as 5 inches. At the conclusion of the note the organ may remain extended until the next note, or may be partially retracted; but when a long interval takes place the structure is always allowed to shrink up to about half an inch or an inch in length, and it then hangs against the beak. During extension the caruncle is never inflated with air, but is always in a state of collapse." Quelch then adds a description of the curious behavior of the bird in uttering its ringing notes, which follow great draughts of air into its lungs. A related species of Costa Rica (*Chasmorhynchus tricarunculata*) has "three enormous band-like caruncles on the forehead where it joins the bill, and one on each side at the corner of the mouth." A Brazilian species (*Chasmorhynchus nudicollis*) is white, with large spaces of naked skin about the eyes, beak, and throat, colored green. In Australia, one of the honey-suckers (Meliphagidæ) is called bellbird—a small greenish-yellow forest bird (*Manorhina melanophrys*), whose *ching-ching* from the tea-tree 'scrub' is welcomed as an assurance that water is near. In New Zealand another honey-sucker (*Anthornis melanura*), now nearly extinct, is given the name for a similar reason; it is remarkable for decorating its thicket-hidden nest with the most gaudy feathers it can find.

BELL, BOOK, AND CAN′DLE. The excommunication by bell, book, and candle is a solemnity belonging to the Church of Rome. The officiating ecclesiastic pronounces the formula of excommunication, consisting of maledictions on the head of the person anathematized, and closes the pronouncing of the sentence by shutting the book from which it is read, taking a lighted candle and casting it to the ground, and tolling the bell as for the dead. This mode of excommunication appears to have existed in the Western churches as early as the Eighth Century. Its symbolism may be explained by quoting two or three sentences from the conclusion of the form of excommunication used in the Scottish Church before the Reformation: "Cursed be they from the crown of the head to the sole of the foot. Out be they taken of the book of life. And as this candle is cast from the sight of men, so be their souls cast from the sight of God into the deepest pit of hell. Amen." The rubric adds: "And then the candle being dashed on the ground and quenched, let the bell be rung." So, also, the sentence of excommunication against the murderers of the Archbishop of Dublin in 1534: "And to the terror and fear of the said damnable persons, in sign and figure that they be accursed of God, and their bodies committed into the hands of Satan, we have rung these bells, erected this cross with the figure of Christ: and as ye see this candle's light taken from the cross and the light quenched, so be the said accursed murderers excluded from the light of heaven, the fellowship of angels and all Christian people, and sent to the low darkness of fiends and damned creatures, among whom everlasting pains do endure." See EXCOMMUNICATION.

BELLE ALLIANCE, bĕl′ ȧ′lē-äNs′, LA (Fr., fine union, beautiful alliance). A farm in the Province of Brabant, Belgium, 13 miles south of Brussels. It is famous as the position occupied by the centre of the French Army in the battle of Waterloo, June 18, 1815. The Prussians gave the name Belle Alliance to this decisive battle; the French named it from Mont-Saint-Jean, the key of the British position, about two miles to the north; while the English name, Waterloo (q.v.), is taken from the village where Wellington had his headquarters.

BELLEAU, be-lō′, RÉMY (1528-77). A French poet, born at Nogent-le-Rotrou. He was a member of the Pléiade (q.v.), soldier, courtier, and tutor at the court of Lorraine. He made several translations from the classics (*Anacréon*, 1556), and published collections of descriptive and pastoral poetry with intermingled prose under the titles, *Petites inventions* (1557), *Bergerie* (1565), and *Amours et nouveaux échanges de pierres précieuses* (1576). His commentaries on Ronsard's *Amours* showed remarkable scope of classical learning and a delicate taste. He wrote also a rhymed comedy, *La reconnue* (*Recognition*), which shows humor and life, and marks progress in the French stage. Belleau is the French Herrick, picturesque, warm, but with a sweetness that cloys, and without true taste or deep passion. His works have been collected by Gouverneur (3 vols., 1867) and by Marty Laveaux (2 vols., 1879).

BELLE CHOCOLATIÈRE, LA, lȧ bĕl shō′-kō′lȧ′tyâr′. A portrait by Jean Étienne Liotard (q.v.) of the Princess of Dietrichstein. Before her marriage, the subject, Annette Beldauf by name and famous for her beauty, was a humble servant in a Viennese café. It is as such that she is represented in the picture. The latter now hangs in the Dresden Gallery.

BELLEFONTAINE, bĕl′fŏn-tān. A city and the county-seat of Logan County, Ohio, on the highest ground in the State, 45 miles northwest of Columbus; on branches of the Cleveland, Cincinnati, Chicago and Saint Louis, and the Toledo and Ohio Central railroads (Map: Ohio, C 5). It has manufactures of carriage-bodies, iron bridges, harness, tools, flour, and cement, and contains a large plant of the Cleveland, Cincinnati, Chicago, and Saint Louis Railroad, including its yards and car-shops. The city was settled in 1818. It is governed by a mayor, elected for two years, and a city council. There are administrative boards of water-works trustees, gas and electric-light trustees, and of schools, each elected independently by the people. Bellefontaine owns and operates its water-works and gas and electric-light plants. Population, in 1890, 4245; in 1900, 6649.

BELLEFONTAINE, BENEDICT. A fine old character in Longfellow's "Evangeline," the father of the heroine. Of primitive simplicity, he was so devoted to his Acadie that he died of grief over the expulsion of his people.

BELLEFONTE, bĕl-fŏnt′. A borough and county-seat of Centre County, Pa., 87 miles northwest of Harrisburg, on the Bellefonte Central, the Central Railroad of Pennsylvania, and the Bald Eagle Valley branch of the Pennsylvania Railroad (Map: Pennsylvania, D 3). It is a summer resort noted for its fine scenery and a famous spring, which, since its utilization in 1807, has not varied in its enormous outflow, abundantly supplying the borough. The State College is 12 miles from Bellefonte. The borough has large lime-quarries and other important industrial interests represented by iron-furnaces, machine-shops, match-factories, shirt-factory, and glass-works. Settled as early as 1770, Bellefonte was incorporated in 1800. The government is administered by a burgess, elected every three years, and a borough council. The water-works are owned and operated by the borough. Population, in 1890, 3946; in 1900, 4216.

BELLEGARDE, bĕl′gärd′ (Fr. *belle*, fem. of *beau*, beautiful + *garde*, protection). A fortress of the second class, perched on an isolated peak, 1380 feet above the sea, in the Department of Pyrénées-Orientales, France. It commands the road from Perpignan to Figueras. Here the French under Philip III. were defeated by Peter III. of Aragon in 1285. It was captured by the Spaniards in 1674, and again by the French under Marshal Schomberg in 1675. After the Peace of Nimeguen (1678-79) a regular fortress, with five bastions, was erected here by order of Louis XIV. In 1793 it was blockaded and taken by the Spaniards under Ricardos, but was retaken, 1794.

BELLE HÉLÈNE, bĕl′ ȧ′lĕn′, LA (Fr., The beautiful Helen). An opéra bouffe, words by Meilhac and Halévy, set to music by Offenbach, and first given in 1864.

BELLEISLE, bĕl′ēl′, CHARLES LOUIS AUGUSTE FOUQUET, Duc de (1684-1761). A French soldier and statesman. He fought bravely in the War of the Spanish Succession (1702-13), and in 1718 against Spain. He became lieutenant-general in 1732, took part in the War of the Polish Succession, and negotiated the treaty three years later whereby Lorraine was united to France. As Minister to Austria he showed himself a determined enemy of the Pragmatic Sanction, and labored to bring the Elector of Bavaria to the throne. In the War of the Austrian Succession he captured Prague, but, finding himself unable to hold it, executed a masterly retreat to Eger (1742). In 1745 he was a prisoner in the hands of the English, but was exchanged. He was made successively duke, peer, and lastly Minister of War. In this last capacity he introduced many useful reforms into the army organization, especially during the Seven Years' War. He was elected a member of the Academy. Consult *Mémoires du Duc de Belleisle* (London, 1760); *Letters* (trans., London, 1759).

BELLE ISLE, bĕl′ ē̇l′ (Fr., beautiful island), or **BELL ISLAND.** A small island situated in the eastern part of Conception Bay, near the southeast extremity of Newfoundland. The soil is fertile and there are fishing interests and rich deposits of brown hematite iron ore, from which there is an average daily output of 3000 tons. Population, 1500.

BELLE ISLE, NORTH, or **BELLE ISLE.** An island in latitude 52° N., longitude 55° 20′ W., lying near the middle of the eastern entrance to the strait of the same name, which separates northern Newfoundland from southeastern Labrador (Map: Newfoundland, E 1). It is nearly 15 miles from either coast, and has an area of about 15 square miles. It has at its southern extremity a lighthouse with a fixed light, at an altitude of 470 feet, and visible for a distance of 28 miles. Below this light, at a height of 128 feet, is a second fixed light. A signal-gun is also fired every half-hour in foggy weather.

BELLE ISLE, SOUTH BELLE ISLE, or **BELL ISLAND.** An island in latitude 50° 45′ N., longitude 55° 30′ W., off the east coast of the northern projection of Newfoundland, 16 miles east of Canada Bay (Map: Newfoundland, E 2). It is a fishing-station, and its area is about 15 square miles.

BELLE ISLE, STRAIT OF. The northern entrance to the Gulf of Saint Lawrence from the Atlantic Ocean, separating southeastern Labrador from northern Newfoundland (Map: Newfoundland, D 1). It is about 80 miles long, and from 10 to 15 miles wide. It offers dangers to navigation, yet is traversed by ocean vessels, and lies in the main route from the Saint Lawrence River to England. See also BELLE ISLE, NORTH.

BELLE-ISLE-EN-MER, bĕl′ē̇l′äɴ′mâr′ (Fr., beautiful island in the sea). An island belonging to the Department of Morbihan, France, in the Atlantic, 8 miles south of Quiberon Point (Map: France, C 4). Its length is 11 miles and its greatest breadth 7 miles. Population, about 10,000, chiefly engaged in pilchard and sardine fishing. Salt is also made on the island, and excellent draught-horses are bred; agriculture is well developed. The chief town is Le Palais, a seaport and fortified place. The island contains many interesting relics of antiquity, and is of great interest historically. Admiral Hawke defeated the French fleet off Belle-Isle in 1759, and the English took the island in 1761.

BELLE JARDINIÈRE, LA, lȧ bĕl zhär′dē̇′nyâr′ (Fr., the beautiful gardener). A painting by Raphael of the year 1507. The subject is the "Madonna and Child," the Beloved Disciple being near. The work is now in the Louvre.

BELLE MIGNONNE, LA. lȧ bĕl mē̇′nyŭn′ (Fr., the pretty darling). A gruesome boudoir decoration of Eighteenth-Century France. It was a skull made as attractive as possible, while yet serving to remind the devotee of the inevitable end.

BEL′LENDEN, EDITH. A character in *Old Mortality*, a novel by Scott. She is engaged to the Cavalier Lord Evandale, but is in love with the Covenanter Morton, and him she finally marries.

BELLENDEN, or **BALLENDEN,** or **BALLENTYNE,** JOHN. A Scottish ecclesiast, poet, and translator, born about the beginning of the Sixteenth Century. He was educated at Saint Andrews University, and in Paris, where he took the degree of D.D. at the Sorbonne. Bellenden is best remembered by his translations of Boece's *Scotorum Historiæ* (done in 1533), and of the first five books of Livy (also done in 1533), interesting as specimens of the Scottish prose of that period, and remarkable for the ease and vigor of their style. To both of these works are prefixed poetical *prohemes* or prologues. Bellenden's *Croniklis of Scotland* professes to be a translation of Boece, but is a very free one, and contains numerous passages not to be found in the original, so that it is in some respects to be considered almost an original work. The author enjoyed great favor for a long time at the Court of James V., at whose request he made these translations. As the reward of his performances he received grants of considerable value from the treasury, and afterwards was made Archdeacon of Moray and Canon of Ross. He opposed the Reformation, and, becoming involved in ecclesiastical controversy, left his country. According to Lord Dundrennan, Bellenden was alive in 1587, but according to others he died much earlier. The translation or 'traductioun' of Livy was first published in 1822 by Mr. Thomas Maitland (afterwards Lord Dundrennan), uniform with his edition of the *Croniklis.*

BELLENDEN, WILLIAM. A Scottish author in the time of Queen Mary and James VI. His personal history is meagre and obscure; all that we know being the testimony of Dempster (*Hist. Eccl.*) that he was a professor in the University of Paris and an advocate in the Parlement there, and that he was employed in that city in a diplomatic capacity by Queen Mary, and also by her son, who conferred on him the appointment of Master of Requests. His first work, entitled *Ciceronis Princeps*, etc., was published in Paris in 1608; his next, *Ciceronis Consul, Senator, Populusque, Romanus*, in 1612. Both these works are compilations from the writings of Cicero. His next work, *De Statu Prisci Orbis*, appeared in 1615, and consists of a condensed sketch of the history and progress of religion, government, and philosophy in ancient times. These three works he republished in a collected form the year after, under the title *De Statu Libri Tres.* His crowning labor, *De Tribus Luminibus Romanorum*, was published after his death. The 'three luminaries' were Cicero, Seneca, and Pliny, out of whose works he intended to compile, on the same plan as his previous works, a comprehensive digest of the civil and religious history, and the moral and physical science of the Romans. The first of these alone was completed, and forms a remarkable monument of Bellenden's industry and ability. "Bellenden," says Hallam, "seems to have taken a more comprehensive view of history, and to have reflected more philosophically on it, than perhaps any one had done before." Bellenden's works furnished the materials for Dr. Middleton's *Life of Cicero*, though that learned divine abstains from any allusion to the forgotten Scot, from whom he plundered wholesale. Warton first denounced the theft, which was afterwards made clear by Dr. Parr, in his edition of *De Statu*, in three books, published in 1787.

BELLE-NIVERNAISE, bĕl′nė′vâr′nȧz′, LA. A boy's story, written by Alphonse Daudet for his son (1886), the authorship of which is claimed, since Daudet's death, by the French critic Hugues Le Roux.

BELLERMANN, bĕl′lẽr-män, FERDINAND (1814-89). A German landscape painter. He was born at Erfurt, and studied with Blechen, Schirmer, and Preller. Besides the mural paintings in the Museum of Art in Berlin, he produced a large number of works, mainly representations of Italian landscapes and of the tropical scenery in South America. Among his principal productions are the following: "Guacharo Cave in Venezuela" (National Gallery, Berlin), "Plateau of Merida," "Sierra Nevada," "Valley of Caracas," "Falls of Terni," "Palace of Queen Joanna."

BELLER′OPHON (probably from its resemblance to the helmet of Bellerophon. See BELLEROPHON). A genus of extinct gastropods of the order Aspidobranchiata. This genus is the type of the family Bellerophontidæ, which is closely related on the one hand to the Pleurotomariidæ and on the other to the Fissurellidæ. The genus contains about 60 species, of which number one-half are American, the remainder European and Asiatic, and which range through rocks of Ordovician to Permian Age. The shells are globose, symmetrically coiled in a single plane, with the whorls rapidly enlarging, and the aperture slightly expanded with a thickened margin. The outer margin of the aperture is somewhat sinuate, and is provided with a small notch or slit, which is homologous with the slit of Pleurotomaria, and which served for the passage of the siphons of the living animal. Extending backward from the slit along the median line is the 'slit-band,' which in some species is replaced by a keel. Although the genus appeared at an early period, it did not attain any considerable prominence until Carboniferous time, when it became quite abundant, and in the rocks of which age it is now a characteristic fossil. The best-known American examples are *Bellerophon crassus* and *Bellerophon precarinatus*, both common in the coal-measures of the Mississippi Valley and the Southwest. A great number of species were formerly included under the name Bellerophon, but more careful study has resulted in their distribution under several new generic names, and even under other family names. Thus the well-known American species, *Bellerophon bilobatus*, so common in and characteristic of the rocks of the Trenton epoch, has been proved to be a member of another genus, Protowarthia. See GASTROPODA.

BELLEROPHON (Gk. Βελλεροφόντης, *Bellerophontēs*, 'slayer of Bellerus'). The son of Glaucus, and grandson of Sisyphus, according to the narrative in *Iliad* vi. He was driven forth by King Prœtus on account of the false accusations of his wife Anteia, who had become enamored of him, but had been repulsed. Prœtus sent him to Anteia's father, King of Lycia, with a sealed message, which advised his death. The King sent him to kill the Chimæra (q.v.), and when he had accomplished this task dispatched him against the Solymi and Amazons, both of whom he defeated, finally destroying an ambuscade set by the King to slay him. Satisfied of his bravery and innocence, the King gave him his daughter in marriage. Later writers modified the story in various ways. Bellerophon was transferred from Argos to Corinth, and made son of Poseidon. He was also aided in killing the Chimæra by Athena, who enabled him to capture the winged horse Pegasus (q.v.). The Homeric version is evidently the hereditary story of the Lycian kings, to prove their Greek origin; but there is evidence in the coins of Corinth that the exploit of Bellerophon was at one time localized in Peloponnesus. Other stories represented him as fleeing to King Prœtus because of the murder of his brother, and as later returning to take vengeance on the wife of Prœtus, here called Stheneboea. In Homer, Bellerophon ends his life-wandering in the Aleian Plain, hated by the gods; but Pindar tells how he tried to ascend to heaven upon Pegasus, but was dashed to the earth. This version was combined with the earlier by making Bellerophon fall upon the Aleian Plain, where he wandered blind and lame. Bellerophon's adventures formed the subject of lost plays of Sophocles and Euripides. In art Bellerophon is sometimes represented with Pegasus alone, but more often in battle with the Chimæra. This scene is also found among the reliefs of the Heroön at Göl-bashi in Lycia. Bellerophon was worshiped as a god at Corinth and in Lycia. There seems good reason to see in him a sea-divinity of the Argolid, like Poseidon, who later sank to the position of a hero. Consult Fischer, *Bellerophon* (Leipzig, 1851).

BELLE′RUS. A fabulous giant associated with Bellerium, the modern Land's End, Cornwall.

BELLE SAV′AGE (Fr. *Belle Sauvage*, 'beautiful savage'). One of the old London taverns, on Ludgate Hill. Built round a court, it was a capital place for an extemporized stage, the performance on which could be viewed from the balcony above. Dickens, in his *Pickwick Papers*, mentions it as the inn visited by old Weller.

BELLES-LETTRES, bĕl-lĕt′tẽr (Fr., fine letters, from *beau*, fem. *belle* + *lettre*). A term adopted into the English and various other languages. It is generally used in a vague way to designate the more refined departments of literature, but has in fact no precise limits. In English usage it is synonymous with another vague expression, 'polite literature,' including history, poetry, and the drama, fiction, essay, and criticism.

BELLE'S STRAT′AGEM, THE. The title of a comedy by Mrs. Hannah Parkhouse Cowley (1780). Lætitia Hardy, the fiancée of Doricourt, is driven by his coolness to strategy in order to win his sincere devotion.

BELLEVILLE, bĕl′vēl′ (Fr., 'beautiful city'). A former eastern suburb of Paris, now a part of that city, and largely inhabited by poor people (Map: France, C 6).

BELLEVILLE. The capital of Hastings County, Ontario, Canada, on the Bay of Quinte, Lake Ontario, at the mouth of the Moira River, and on the Grand Trunk Railway, 60 miles west of Kingston (Map: Ontario, F 3). It is a thriving town and an important dairy centre, with iron-foundries, factories, sawmills, branch banks, Albert University, with separate colleges for males and females, a fine asylum, and many churches. It is the seat of a United States consulate. Population, in 1891, 9000; in 1901, 9119.

BELLEVILLE, bĕl′vĭl. A city and county-seat of Saint Clair County, Ill., 14 miles east by south of Saint Louis, Mo.; on the Illinois Central, the Louisville and Nashville, and the Southern railroads (Map: Illinois, B 5). It is the seat of a Roman Catholic bishop, and contains the Belleville Fair Grounds, a public library, founded in 1836, Saint Elizabeth Hospital, and a commercial school. The city is in a productive agricultural and coal-mining region, and is noted also for its manufactures, the principal establishments including stove-works, foundries and machine-shops, nail-mill, tack-works, glass-works, shoe-factory, distillery, breweries, and flour-mills. Settled in 1814, Belleville was incorporated first in 1846. The government, under a revised charter of 1872, is vested in a mayor, elected every two years, who appoints all the important administrative officers, and a city council. Population, in 1890, 15,361; in 1900, 17,484.

BELLEVILLE. A city and county-seat of Republic County, Kan., 205 miles west by north of Kansas City; on the Union Pacific and the Chicago, Rock Island and Pacific railroads (Map: Kansas, E 2). It is in an agricultural district, and has grain-elevators, flour-mills, lumber-yards, etc. The water-works are owned and operated by the city. Population, in 1890, 1868; in 1900, 1833.

BELLEVILLE. A town in Essex County, N. J., on the Passaic River and the Erie Railroad. It is a popular suburb of Newark, with which it is connected by electric roads, and has important manufactures of wire-cloth, druggists' rubber supplies, metal goods, brushes, bicycle-tires, brass-foundry products, chemicals, etc. Population, about 3000.

BELLEVUE, bĕl-vū′. A city in Campbell County, Ky., on the Ohio River, opposite Cincinnati, and on the Chesapeake and Ohio Railroad (Map: Kentucky, G 1). The city is primarily a residential place, and is growing rapidly. Settled in 1866, Belleville was incorporated in 1871. Its charter provides for a mayor, elected every four years, and a city council. Population, in 1890, 3163; in 1900, 6332.

BELLEVUE. A village in Huron and Sandusky counties, Ohio, 15 miles south by west of Sandusky; on the Lake Shore and Michigan Southern, the Wheeling and Lake Erie, and the New York, Chicago and Saint Louis railroads (Map: Ohio, E 3). It is the centre of a fertile agricultural region, the principal products of which it exports extensively, and has some manufactures, including large cultivator-works. Population, in 1890, 3052; in 1900, 4101.

BELLEVUE, bĕl′vụ′. A château of Madame de Pompadour, near Sèvres, only ruins of which remain.

BELLEW′, Harold Kyrle (1857—). An English actor and playwright. He is the son of a clergyman of Calcutta, but was born in England. Of his early life, seven years were spent as a cadet in the British Navy, after which he went to Australia, where he was an actor, a newspaper man, and a lecturer. He returned to England, and made his début at Brighton. He was soon well known in London in leading parts. His first appearance in America was in October, 1885, in *In His Power*, at Wallack's Theatre, New York, where during the following season he was leading man. He next (1887) began his long connection with Mrs. James Brown Potter, with whom he has played throughout the English-speaking world. Among his notable rôles have been Leander to Mrs. Potter's Hero, in his own play, *Hero and Leander*, produced at the Shaftesbury Theatre, London (June, 1892); Marat, in *Charlotte Corday* (1895); and Romeo, which he played, with Mrs. Potter as Juliet, in New York in March, 1896, and later the same year in Australia. Besides *Hero and Leander*, Bellew is the author of *Yvonne* and *Iolande*, and various adaptations for the stage. In 1901 he appeared again in America.

BELLEY, be-lā′. The chief town of an arrondissement in the Department of Ain, France, picturesquely situated in the interesting Val Romney, 18 miles northwest of Chambéry. It is the seat of a bishopric, and has a fine modern cathedral in Fifteenth-Century Gothic, an episcopal palace, a museum, and a public library. Lithographic stone, the best in France, is quarried and exported from the neighborhood, and it has silk and cotton industries. The ruins of a Roman temple attest the antiquity of Belley. Population, in 1896, 6070.

BELL-FLOWER. See Campanula.

BELLI, bĕl′lē, Giuseppe Gioachino (1791-1863). An Italian popular poet. He was born in Rome and began life as a poor scribe in the employ of Count Rospigliosi, but a wealthy marriage left him free to devote himself to letters. His poems in the literary language are not especially noteworthy. His sonnets, on the contrary, of which there are more than 2000, written in the dialect of Rome, are unsurpassed in their own peculiar vein. They are vivid, realistic portrayals of the life of the Roman populace, in all its panoramic variety, presented with a truth, a sincerity, and a vein of lively satire which make each separate sonnet a masterpiece of its kind. The Papal Government under Gregory XVI. came in for a goodly share of his irony, for which later on he vainly tried to atone by writing religious poems in defense of the Jesuits. A complete edition of the sonnets, under the title of *I sonetti romaneschi*, is edited by Morandi (Città di Castello, 1886-89).

BELLIARD, bĕl′yär′, Augustin Daniel, Count (1769-1832). A French diplomat and soldier; born at Fontenay-le-Comte (Vendée). He served with distinction in the French Army during the Revolution, and was appointed brigadier-general at the battle of Arcole. He was chief-of-staff under Murat, fought in the principal engagements of 1805, 1806, and 1807, and afterwards became Governor of Madrid. He distinguished himself at Borodino, and upon his recovery from a wound received at the battle of Leipzig was appointed commander-in-chief of cavalry. Although elevated to the peerage upon the accession of Louis XVIII., he rallied to the support of Napoleon upon the return of the latter from Elba, and was sent as ambassador to Naples, where, however, owing to the mistakes of Murat, he was able to accomplish little. After a varied career under the monarchy, he became the ambassador of Louis Philippe to Brussels, where he signed the treaty separating Belgium from Holland. He also contributed greatly to the reorganization of the Belgian Army. In 1836 a monument to him was unveiled in the city of Brussels. His autobiography was published in Paris, in 1842, under the title of *Mémoires du général Belliard écrits par lui-même.*

BELLIG'ERENT (Lat. *belligerare*, to wage war, from *bellum*, war + *gerere*, to carry). In international law, a government actually at war. It is not necessary that a political community shall be independent in order to have the status of a belligerent, but it must be maintaining itself by regular hostilities or otherwise under a *de facto* government. When a state of war exists between sovereign powers, the rights and duties of the several parties, both as between themselves and as to neutral powers, are in general clearly defined. Modern usage requires that the existence of a state of war shall be made known to neutral powers by public proclamation. (See DECLARATION OF WAR.) As between the belligerent powers, the rules of modern warfare require that the lives and property of non-combatants shall be respected, forbid undue cruelty and the use of barbarous weapons and methods of warfare, and dictate that no more damage shall be inflicted than is necessary to obtain victory. Where an enemy's territory is occupied, the hostile authority may require the submission of the inhabitants, and may lawfully exercise over them the police and taxing powers of the government. As regards neutrals, the tendency of modern international law is to relieve them, their ships, their goods, and their trade, as far as possible, from the dangers and inconveniences of the war, and, on the other hand, to hold them strictly to a policy of complete abstention from the concerns of the warring States. See ALABAMA CLAIMS; BLOCKADE; GENEVA CONVENTION; HAGUE PEACE CONFERENCE; INTERNATIONAL LAW; NEUTRALITY; WAR.

A more difficult question is presented when both parties to the struggle are not sovereign political communities, but one a colony in rebellion against the parent State, or a revolutionary section or party waging war against the general Government. Unless the conditions are such as to bring about the international recognition of the rebellious party as a belligerent, it has no standing in international law, and its acts of war are technically acts of piracy. It has no belligerent rights, and is not entitled to have its blockades respected or its vessels received in foreign ports. It is the recognition of an insurgent government as a belligerent by neutral powers which brings it within the protection of the laws of war. But this act, which involves no decision of the questions at issue between the contending parties, but only an official recognition of the fact that a state of war exists, must be carefully distinguished from recognition of the independence of the insurgent government. This amounts to a declaration that the parent State is unable to coerce the rebellious subject, and carries with it a recognition of the latter as a sovereign power.

For the neutral State, the question of the recognition of belligerency is one of expediency. Such recognition cannot be claimed by an insurgent as a matter of right. It may be conceded on purely selfish grounds, if the trade or other interests of the neutral call for such action; or it may be granted in response to the demands of humanity or of general international policy. But in order to be justifiable in international law, the recognition must rest upon certain accomplished facts—viz. the existence, in the rebellious community, of a stable, well-organized civil government, exercising *de facto* authority in a definite territory, and the existence of actual and serious hostilities, carried on by such constituted authority for a considerable period of time, though these need not be regular in character nor general in extent. If, in addition to all this, the insurrection is of a formidable character, if the hostilities are on a large scale, and, especially, if they are of such a nature as to threaten the interests of neutral States, the case for recognition of belligerency may become so strong as to be conclusive. When an internecine struggle presents the aspect of a war between federated States—as in the American Civil War, and the conflict between Prussia and the majority of the German Confederation in 1866—belligerent rights are usually accorded to both the contending parties impartially. The recognition of the Southern Confederacy by Great Britain and France in 1861, though strenuously opposed by the Government of the United States, was undoubtedly proper and necessary.

It remains to be noted that the grant of belligerent rights to an insurgent government is not an unmixed blessing, even to the recipient, and that it carries with it certain benefits to the other party to the contest. Its principal advantage to the former is the powerful moral support which it gains from international recognition. In addition to this, it acquires the substantial benefits, already alluded to, of protection by the laws of war; the recognition of its flag, the right to negotiate loans abroad, and, in general, a quasi-political status, though without diplomatic standing. On the other hand, the status of belligerency carries with it the obligation to observe the rules of civilized warfare, and it shifts the responsibility for damage caused to neutral commerce and to the citizens of neutral States from the sovereign party to the party in insurrection. Accordingly, in the American Civil War, Great Britain and France, having recognized the Southern Confederacy as a belligerent power, were unable to charge the Federal Government with liability for injuries to their subjects inflicted by the Confederate Government or by its citizens in the territory occupied by it; whereas the Government of Turkey, which did not recognize the Southern States, remained in a position to hold the United States responsible for the acts of its rebellious citizens.

Certain acts of war on the part of the sovereign or parent States in connection with rebellious subjects—as a proclamation or establishment of a blockade of the insurgent ports, an exchange of prisoners, the enforcement of the rules of war as to the carriage of contraband goods by neutrals—constitute in international law an implied recognition by the former of the belligerent status of the latter; but this affects only the character of the struggle between the parties, and does not in itself alter the relations of the insurgent Government to neutral

States, though it may afford a moral ground for international recognition. In practice, such recognition is usually effected by issuing a proclamation of neutrality, in which the rights of the combatants and the duty of neutrals in relation to them are briefly indicated. See INTERNATIONAL LAW. Consult: Snow, *Manual of International Law* (2d ed., Washington, 1898); Wheaton, *Elements of International Law* (8th ed., Boston, 1866); and authorities referred to under the titles INTERNATIONAL LAW; NEUTRALITY, etc.

BEL′LING, WILHELM SEBASTIAN von (1719-79). A Prussian general of cavalry under Frederick the Great, born at Paulsdorf (East Prussia). He was appointed a cornet of hussars in 1739, rose in 1749 to be major, and in 1758 was assigned, with rank of lieutenant-colonel, to the command of the regiment subsequently known as the 'Black Hussars.' Having been promoted to be colonel, he became famous in 1759-61 by his defensive operations against the Swedish Army in Pomerania and Mecklenburg. In 1762 he became a major-general, in 1776 lieutenant-general, and 1778 appeared prominently in the War of the Bavarian Succession. It was by him that Blücher, then a cornet in the Swedish Army, was taken prisoner at Kavelpass, and persuaded to enter the Prussian service.

BEL′LINGHAM, RICHARD (1592-1672). A colonial Governor of Massachusetts, born in England. He was recorder of Boston (Lincolnshire), England, from 1625 to 1633, and in 1634 emigrated to America and settled in Boston, Mass. In 1635, and twelve times thereafter, he was Deputy Governor of the colony, and for some time was Treasurer. He was elected Governor over Winthrop in 1641, and was reëlected in 1654, and again in 1665, holding the office altogether for ten years. In 1664 he was also chosen major-general. In the same year he stoutly resisted the royal commissioners, who had ordered him to London to undergo a thorough examination with regard to his official conduct; but, though refusing to recognize their authority, he secured the good-will of the King by the present of "a shipload of masts." As a magistrate, though frequently eccentric and erratic, he was a shrewd administrator, just and upright, and had a decided aptitude for public affairs. In matters of religion he was stern and intolerant, and while in office treated the Quakers with especial rancor. In his will he provided that his property should eventually be devoted to the support of "godly ministers and preachers"; but this provision was annulled by the General Court as being unjust to his family. He was the last survivor of the original patentees of the Charter. His sister, Anne Hibbens, was executed as a witch at Salem in June, 1656.

BELLINGSHAUSEN, bĕl′lĭngz-hou′zen, FABIAN GOTTLIEB von—in Russian, Faddei Faddeyevitch Bellingshausen—(1778-1852). A Russian admiral and explorer, born on the island Osel (belonging to Livonia). He was appointed an officer of the fleet stationed at Reval in 1797, and in 1803 participated in the first Russian circumnavigation of the globe. In July, 1819, he was assigned by the Emperor Alexander to the command of an exploring expedition to the south polar regions. With two corvettes, the *Vostok* and the *Mirny*, he traversed the Antarctic Circle, discovered the island which he named Traversay, in December, 1819, and thence penetrated to latitude 70° S., where he discovered and named Peter Island and Alexander Land. The expedition arrived at Cronstadt August 5, 1821. He took part in the military operations against Varna in 1828, was advanced to the rank of vice-admiral, and was placed in command of the Russian Baltic Fleet. Afterwards he became admiral and military governor of Cronstadt, where a fine bronze statue, designed by Schröder, was erected to his memory in 1869. An account of his explorations was published in Saint Petersburg in 1831.

BELLINI, bĕl-lē′nē. A celebrated family of Venetian painters of the Renaissance. JACOPO (c.1400-c.64), the founder of the family, was a pupil of Gentile da Fabbriano, whom in 1423-25 he accompanied to Florence. He was active as a painter at Verona, at Padua, where Mantegna married his daughter, and at Venice. Two admirable sketchbooks, one from his early period in the British Museum, and another of the later period in the Louvre, show him as an eager student of the antique and of perspective, anatomy, and physiognomy. His principal works, among them a fresco of the Crucifixion in the Cathedral of Verona, have perished; but there are canvases of the same subject by him in the Verona Gallery and in the Museo Correr, Venice. Among his other works are Madonnas at Lovere and in the Venetian Academy and an "Annunciation" in Sant' Alessandro, Venice.

The early works of his two sons show a marked influence of the Paduan school. GENTILE (c.1428-1507), the elder, most resembled his father in technique and in conception. Of the events of his life, we know that in 1464 he was commissioned to decorate the organ-shutters of Saint Mark's, which still survive; in 1465 to paint a full-length portrait of the Patriarch Lorenzo Giustiniani, now in the Academy; and that in 1469 he was made a count palatine of the Empire. He was in 1474 commissioned to restore the decorations of Gentile da Fabbriano in the Ducal Palace. In response to the request of the Sultan that the Venetian Government send him their best painter, he went in 1479 to Constantinople. Artistic mementos of this journey are still to be seen in his portrait of Mohammed II. in the Layard Collection, Venice, and in the oriental types and costumes which he thenceforth delighted to introduce into his pictures. After his return to Venice, he labored for thirty years on the great historic decorations of the Ducal Palace, which were destroyed by fire in 1577. His chief surviving works are three large canvases now in the Venetian Academy, representing the miracles wrought by a relic of the True Cross. His last work was the "Preaching of Saint Mark" (Brera, Milan), completed after his death by his brother Giovanni. He excelled especially in portraiture, as is attested by his "Caterina Cornaro" (Pesth), "A Mathematician" (London), and two heads in the Louvre. To a fine feeling for line Gentile united harmonious coloring, and he was especially strong in composition. He was a keen realist, and for his day the open-air effects of his pageant pictures are very remarkable.

GIOVANNI (c.1430-1516) was probably the younger son of Jacopo. Even more than those of Gentile, his early works show Paduan influence. In fact, they are often confounded with Andrea Mantegna's, and reveal a careful study of the sculptures of Donatello at Padua. Among the best of them are the "Crucifixion," "Transfiguration," and "Pietà" in the Museo Correr, the "Agony in the Garden" in the National Gallery, and a number of Madonnas in the Venetian Academy and elsewhere. After 1460 his Venetian characteristics begin to prevail, and an epoch in his art is marked by his journey to Pesaro. Hitherto he had executed small devotional pieces; but with his large "Coronation of the Virgin," painted for San Francesco in that town, he began a series of large altar-pieces, through which he is chiefly known. A reminiscence of his journey to Pesaro is shown in the beautiful "Transfiguration" at Naples. Between 1480 and 1490 he painted a large number of his most important works, like the Madonna in the National Gallery, the one in the Venetian Academy with Saints Catharine and Mary Magdalen, the altar-piece of San Giobbe (1487)—also in the Academy—and the famous Madonna with the Doge Barberino at Murano (1488). In the nineties he was occupied with the decorations of the Ducal Palace. The allegories in the Academy and the "Tree of Life" in the Uffizi probably date from the same period. The principal works of his latest period are the "Baptism of Christ" in Santa Corona, Vicenza, the altar-pieces of San Crisostomo and San Zaccaria, Venice, in the last of which he approached the new style of High Renaissance, and his last-known work, the "Madonna and Child" (1514) in the Brera. He is the most important figure in Venetian painting of the fifteenth century, to which he gave his individual impulse. He was a colorist rather than a draughtsman, and was the chief influence in giving Venetian painting its wonderful golden tone. He was also celebrated as a portrait painter. Consult Thuasne, *Gentile Bellini et le sultan Mohammed II.* (Paris, 1888); Müntz, in *Gazette des Beaux-Arts* (ib., 1884); Berenson, *Venetian Painters at the Exposition of Venetian Art* (London, 1895); Fry, *Giovanni Bellini* (ib., 1899).

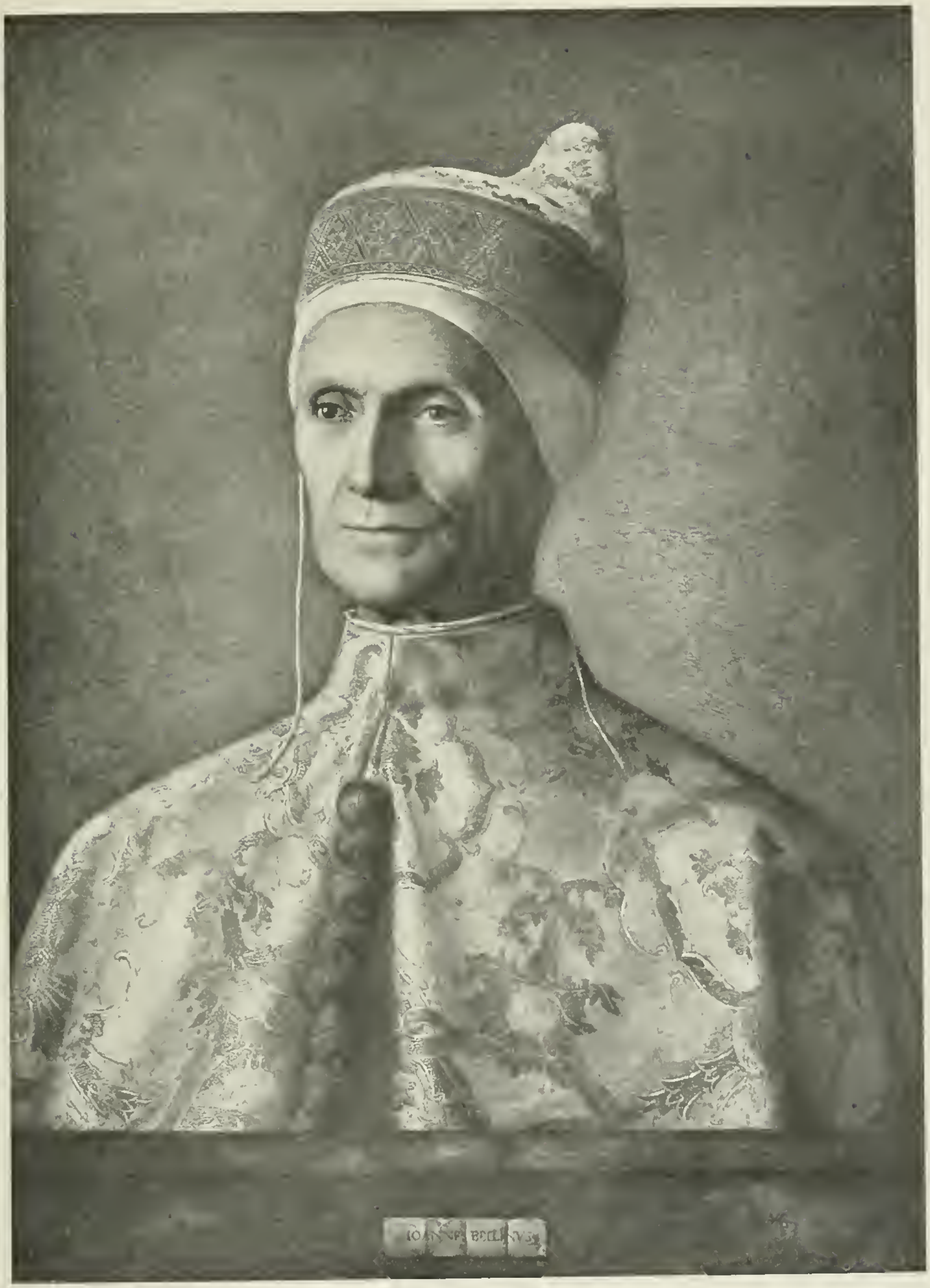
BELLINI, Lorenzo (1643-1704). An Italian anatomist and physician. He studied medicine under Redi, was professor of anatomy at Pisa, and in Florence was physician to the Grand Duke Cosmo, and also senior consulting physician to Pope Clement XI. Among his discoveries were the action of the nerves on the muscles and the uriniferous ducts, known as Bellini's tubes. He left also an original and curious book of poetry, the *Bucchereide* (1729).

BELLINI, Vincenzo (1802-35). A famous Italian operatic composer. He was born at Catania, Sicily, and died at Puteaux, near Paris. Born of a musical family, he entered the conservatory of Naples (1819), where he studied under Zingarelli. After writing various instrumental and choral compositions, he produced *Adelson e Salvina* (1824), the success of which was duplicated by that of *Bianca e Fernando* at the San Carlo, Naples (1826), and Bellini was engaged to write an opera for La Scala at Milan. After *Il Pirata* (1827), he became the most popular composer in Europe, and his fame grew with each of the following operas: *La Straniera* (1828); *Capuleti e Montecchi* (1830); *Sonnambula* (1831); *Norma* (1831); *Beatrice di Tenda* (1833). He settled in Paris and gave himself up to the study of French music, diction, and verse, and then produced *I Puritani* (1834) at the Théâtre Italien, Paris. Its success eclipsed that of all his previous efforts. He was preparing for another work when death came unexpectedly at Puteaux, near Paris. All Europe mourned for him, and his funeral was an impressive pageant. A monument to Bellini was erected in Catania in 1868, where his remains now rest, and another in Naples in 1836. In 1901 the centenary of his birth was celebrated throughout Italy and in many European cities. A man of wide culture and deep refinement, of the elegiac and sentimental type of Chopin, he had not the personal sorrows of the Polish master to make his grief morbid. His melancholy nature came into the world at the most opportune moment: Italy was groaning under foreign masters; *Norma* was but a lament over his country's bondage. His Druids and Gallic warriors were thinly disguised Italians of his time. The opera was a great advance on his previous works, which were criticised for the thin orchestration and lack of structural unity. He heeded the critics, and *Norma* may fairly be called a classic production. Wagner viewed it as such for its heroic grandeur, tragic power, and pathos, combined with an unequaled flow of melody and striking orchestration. *Norma* has been the favorite part of the greatest dramatic songstresses, such as Pasta, Viardot-Garcia, Jenny Lind, Bürde-Ney, and Lilli Lehmann, the famous Wagnerian soprano. Bellini's music is particularly grateful to the voice, and all famous singers, from Pasta and Viardot, through Schröder-Devrient and Johanna Wagner, down to Patti, Nilsson, and Sembrich, have kept his operas in their repertoires. Consult: Pougin, *Bellini, sa vie, ses œuvres* (Paris, 1868); Amore, *Vincenzio Bellini* (Catania, 1892-94); Florimo, *Bellini: Memorie e lettere* (Florence, 1885); G. T. Ferris, *Great Musical Composers* (New York, 1887).

BELLINZONA, bĕl′lĕn-zō′nȧ, or **BELLENZ,** bĕl′lĕnts. The capital of the Canton of Tessin or Ticino, Switzerland, on the left bank of the Ticino (Map: Switzerland, C 2). The town is most picturesquely situated at an elevation of 775 feet above sea-level, and commands the Saint Gotthard route. It was fortified by the Visconti in the Middle Ages, and modern defenses have been built on the site of the old fortifications to protect the position of the town at the junction of the Saint Gotthard Railroad with that to Locarno. Population, in 1900, 5000.

BELL′MAN, Karl Mikael (1740-95). A Swedish lyric poet. He was born in Stockholm, the son of a professor at Upsala, and began to write poetry at an early age, often composing the melodies for his songs. The favor of Gustavus III. relieved him from care, but he suffered from ill health, and on the murder of the King (1792) he was for a time a prisoner in the castle where he had been a frequent guest. His poems express the joy of life, and occasionally a coarse revelry, but there is usually a cynic or pathetic undertone. His more important works are collected in *Fredmans epistlar* (1790) and *Fredmans sånger* (1791). Consult Erdmann, *Carl Michael Bellman* (Stockholm, 1900).

BELLO, bĕ′lyȯ, Andres (1781-1865). A Spanish-American author; born at Caracas. He was Venezuelan commissioner of war, and accompanied Bolivar and Lopez Mendez in the



GIOVANNI BELLINI

THE "DOGE LEONARDO LOREDANO," FROM THE PAINTING IN THE NATIONAL GALLERY, LONDON

capacity of secretary to London, to solicit aid for the South American insurgents. Here he held the position of secretary of the Colombian Legation until 1829, when he returned to Caracas. Afterwards he removed to Chile, where in 1834 he was appointed Secretary of State, and in 1842 rector of the University of Santiago. His numerous and valuable works include the following: *Principios de derecho internacional* (1832; latest ed., 1883); *Gramática de la lengua castellana, dedicado al uso de los Americanos* (latest ed., 1891). His complete works were published by the Chilean Government in 1885 (*Obras de Andres Bello*, 8 vols., Santiago de Chile; reprinted in Madrid in the *Colección de escritores castellanos*).

BELLOC′, Hilaire (1870—). An English writer. He was educated at Balliol College, Oxford, where he took honors in history, and served in the French artillery at Toul. His books include: *The Bad Child's Book of Beasts* (1896); *More Beasts for Worse Children* (1897); *The Modern Traveler* (1898); *Danton* (1899); *Lambkin's Remains* (1900); *Robespierre* (1901); and *The Path to Rome* (New York, 1902).

BELLO HORIZONTE, bĕl′lô ŏr′ē-zōn′tȧ. A city of Brazil. See Minas.

BELLO′NA (Lat., from *bellum*, war). The goddess of war among the Romans. She was described by the poets as the companion, sister, wife, or daughter of Mars; she was also represented as armed with a bloody scourge, and as inspiring her votaries with a resistless enthusiasm in battle. In the war with the Samnites, the Consul Appius Claudius vowed a temple to Bellona, which was erected afterwards on the Field of Mars. In this temple the Senate gave audience to embassies from foreign powers, and also to consuls who had claims to a triumph which would have been nullified by entrance into the city. The priests of another (Asiatic) goddess of the same name were styled *Bellonarii*, and practiced sanguinary rites, such as cutting their own arms or feet, and offering (or even drinking) the blood in sacrifice.

BELLOT, be-lō′, Joseph René (1826-53). A French Arctic explorer; born in Paris. He was a lieutenant in the navy, distinguished himself in the French expedition against Tamatave in 1845, and joined an expedition in search of Sir John Franklin in 1851. During this expedition he accompanied a sledge-party that reached the strait now bearing his name. In the expedition fitted out by the British Admiralty under Captain Inglefield, he sailed as a volunteer in H.M.S. *Phœnix*, but never returned, having been carried by a violent gust of wind, March 21, 1853, into a deep fissure in the ice. His *Journal of a Voyage to the Polar Seas Made in Search of Sir John Franklin* in 1851-52, edited, with a notice of his life, was published at Paris in 1854.

BELLOT STRAIT. A narrow passage in the Arctic regions which separates North Somerset from the peninsula of Boothia Felix, and connects Prince Regent's Inlet with Franklin Channel. Its east entrance was discovered by Kennedy during his search for Franklin, and named after his companion, the French lieutenant Bellot. The channel was later with much difficulty explored by McClintock. It is about 20 miles long, and, at its narrowest part, about 1 mile wide; it lies nearly on the parallel of 72°, between granite shores, which, everywhere high, rise here and there to 1500 or 1600 feet. Through this funnel-shaped passage both the winds and the permanent currents and flood tides which come from the west have full play.

BELLOTTO, bĕl-lŏt′tō, Bernardo. See Canaletto.

BELLOWS, bĕl′lūs. See Blowing-Machines.

BELLOWS, bĕl′ōz, Henry Whitney (1814-82). A well-known American clergyman. He was born in Boston, Mass., graduated at Harvard in 1832, and at the Divinity School in 1837, and in 1839 became pastor of the First Congregational (now All Souls) Church in New York. He acquired a great reputation as a pulpit orator and as a writer, and in 1846 established the *Christian Enquirer*, to which he was the chief contributor until 1850. With unusual literary taste and skill he combined practical and administrative ability of a high order, and as the chief promoter and president of the United States Sanitary Commission from 1861 to 1878, rendered a service of almost incalculable value to the country. (See Sanitary Commission.) During the war he directed the expenditure of more than $5,000,000, and the distribution of more than $15,000,000 worth of supplies. The most noteworthy of his writings are: *The Treatment of Social Diseases* (1857); *Restatements of Christian Doctrine* (1860); and *The Old World in Its New Face* (1869).

BELLOWS FALLS. A village in the town of Rockingham, Windham County, Vt., 114 miles northwest of Boston, Mass., on the Connecticut River, and on the Rutland and the Boston and Maine railroads (Map: Vermont, D 9). The village is surrounded by grand mountain scenery, and is noted particularly for the falls, which, with a descent of about 40 feet, also supply power for manufactories. The principal manufactures are paper, paper-machinery, agricultural implements, dairy fixtures, and casein products. The village owns and operates its water-works, and contains the public library of the town. Probably settled as early as 1784, Bellows Falls was incorporated in 1833; it is now governed under a charter of 1890. The officers, elected annually, include a clerk, 3 bailiffs, 3 water commissioners, a street commissioner, and 3 fire wardens. Village corporation meetings are convened annually, and at special times, subject to the call of the bailiffs. Population, in 1890, 3092; in 1900, 4337.

BELLOWSFISH, bĕl′lūs-fĭsh′. See Globe-Fish.

BELLOY, be-lwä, Pierre Laurent Buirette de (1727-75). One of the first French dramatists who ventured to introduce on the stage native, instead of classic heroes. He was born at Saint Flour, in Auvergne, and educated for the law, but became an actor, under the name of Dormont de Belloy. For some years he resided in Saint Petersburg, where the Empress Elizabeth interested herself in him. In 1758 he returned to France, to superintend the production of his tragedy *Titus*. The piece proved a failure, and he returned to Saint Petersburg. Afterwards, however, he obtained a decided success in Paris by his tragedy of *Zelmire*. In 1765 appeared *Le Siège de Calais*, an historical and patriotic drama, which was immensely popular, and is even yet held in esteem. In 1772 he was admitted to the French Academy, after the production of his *Gaston and Bayard.* This was followed by *Pierre le cruel*, which, though it failed at first, was afterwards successfully revived. His collected works were published in 1779, edited by his friend Gaillard, who wrote his life. Consult Godefroy, *Histoire de la littérature française*, "XVIIIe siècle poëtes" (Paris, 1879).

BELL'-RING'ING. The ringing of bells in changes of regular peals is largely a European practice. It was early brought to a high degree of proficiency in the Netherlands. In some of the church-towers there the striking, chiming, and playing of bells is incessant, including the playing of regular tunes. In some instances, for this latter purpose, the bells are sounded by means of a cylinder, on the principle of a barrel organ; in others they are played with keys by a musician. The ringing of bells has also become a distinct art in Great Britain. According to the English method the bell at each pull revolves round a complete circle, and is under the full command of the ringer. The first known writer on the subject is the author of a book called *Tintinnalogia* (1668), said by some to have been Fabian Stedman, a Cambridge printer, who printed his changes on slips of paper in a notation of his own invention, and taught them to his company in the tower of Saint Benedict's Church, Cambridge. According to his account there was no idea of change-ringing until the beginning of the Seventeenth Century, though there certainly seem to be traces of it in the earliest English comedy, Udall's *Ralph Roister Doister* (1553). The art made rapid progress, and rings of bells increased from five or six to ten or twelve, the latter being the greatest number ever rung in peal. The variety of changes increases enormously with the increase in the number of bells. Six changes can be rung on three bells: on four, four times as many; and so on until with twelve bells the enormous number of 479,001,600 different changes can be rung.

Bell-ringing has an interesting system of nomenclature. The simplest peals are those called *grandsire* on an odd number of bells, and *bob* on an even number. Changes on three bells are called *rounds;* on four, *changes* or singles; on five, doubles or *grandsires;* on six, *bobs minor;* on seven, *grandsire triples;* on eight, *bobs major;* on nine, *grandsire caters;* on ten, *bobs royal;* on eleven, *grandsire cinques;* on twelve, *bobs maximus.* A bell is *set* when its mouth is turned upwards; at *hand stroke* when set up so far that only the *tuffing* or *sallie* is held by the ringer; at *backstroke* when rung so far round that the end of the rope is held. The *treble* bell is the highest, the *tenor* the lowest of a set. Five thousand changes are a *peal;* any smaller number constitutes a *touch* or *flourish*—i.e. a practice rather than a performance.

It may be interesting to note here that the old-fashioned bell-ringer has been banished from one of the most notable church-chimes in America by those most modern of methods of power-transmission, electricity and compressed air. The chimes of Saint Patrick's Cathedral in New York City consist of 19 bells, weighing from 270 pounds to 6000 pounds, and having a musical range from lower C to upper D, with the accompanying sharps and flats. These chimes were first played on January 1, 1901, from a keyboard in the sacristy, by means of a combination of electricity and compressed air, devised and constructed by Mr. H. C. Champ, of Brooklyn, N. Y. The apparatus is described by *The Engineer* as follows: "It is an adaptation of the compressed-air cylinder adopted by the Union Switch and Signal Company. Mr. Champ, in following their idea, constructed 19 bell-engines, corresponding to the number of bells. These bell-engines are bolted to wooden seats, which in turn are bolted on a system of steel beams inserted in the walls of the north tower. These engines consist in their working parts of a fine grade of bronze composition metal, so as not to rust or corrode. The engines practically consist of three main parts, two cylinders and a piston, which is fitted to a clip hung on the clapper of the bell above it. On the engine there is an adjustable clevis, so that the stroke can be arranged to a nicety, and once so adjusted it cannot change its position. The engines are operated from the sacristy by means of a keyboard. A key being depressed, a current of electricity is sent along its wire to the belfry, where, by means of an air-valve operated through an electro-magnet, the compressed air is admitted to the bell-engine, and the air-pressure delivers the blow, which acts upon the clapper and rings the bell." Consult: Lomax, *Bells and Bellringers* (London, 1879); Ellacombe, *Practical Remarks on Belfries and Ringers* (London, 1859-60). See BELL.

BELL ROCK, or **INCH CAPE.** A reef of Old Red Sandstone rocks in the North Sea, 12 miles southeast of Arbroath, Scotland, nearly opposite the mouth of the Tay. The reef is 2000 feet long; at spring-tides part of it is uncovered to the height of 4 feet, and for 100 yards around the sea is only 3 fathoms deep. Since 1810 it has been marked by a lighthouse 120 feet high. It was formerly a fruitful cause of shipwreck, and, according to tradition, the Abbot of Aberbrothock (Arbroath) placed a bell on it in the Twelfth Century. It is the scene of Southey's poem, *The Inch Cape Rock* (q.v.).

BELLS. A term used on shipboard, and nearly equivalent to the 'o'clock' of ordinary life on land. The day is divided into 6 periods of 4 hours each, beginning at midnight. At half-past twelve 1 bell is struck; at one o'clock 2 bells; at half-past one 3 bells; and so on up to 8 bells at four o'clock. At half-past four it is 1 bell again; at five, 2 bells, and so on up to eight o'clock. Half-past eight is 1 bell, etc. The 6 periods nearly coincide with the *watches* (see WATCH) into which the day is divided, but not exactly, for the 4 hours from four to eight P.M. are divided into dog-watches of 2 hours each.

BELLS, THE. (1) The title of a poem by Edgar Allan Poe. (2) The name of the drama adapted by Leopold Lewis from Erckmann-Chatrian's *Le Juif polonais*, and frequently presented by Sir Henry Irving. It deals with the murder of a Polish Jew by an innkeeper, from whose tavern he has just driven off in his sleigh. The innkeeper, Mathias, is so haunted by the recollection of his crime that the sound of the sleigh-bells begins to ring in his ears, and eventually drives him mad.

BELL-THE-CAT. A name given to Sir Archibald Douglas, who, when certain Scottish lords were considering how to remove the upstart mason, Cochrane, from James III.'s favor, answered "That will I," to the inquiry, "Who will bell the cat?"

BELL-TOW′ER. A tower built to contain one or more large bells in connection with religious or civil structures. The use of bells for calling religious or political gatherings, or announcing times and seasons, does not seem to have obtained in antiquity. Public criers and heralds were the main announcers, as the *muezzins* still are in the East. Small bells, rung by hand, were used, however, by the early Christians. It is certain that while large towers were erected in connection with churches as early as the Fifth and Sixth centuries, the use of large bells suspended in towers did not become general until much later, probably toward the close of the Eighth Century. Pope Stephen III. (768-772) erected a bell-tower with 3 bells at Saint Peter's, and Leo IV. (847-855) did the same for Saint Andrew's at Rome. For the bell-tower of Charlemagne's Cathedral at Aix-la-Chapelle, Tancho, of Saint Gall, cast a bell weighing apparently between 400 and 500 pounds. These dimensions were increased, until bells weighing from 2000 to 3000 pounds were cast in the Eleventh and Twelfth centuries, but it was not until the Thirteenth Century that any great weight was reached. Therefore, even after bells were placed in towers, they remained for centuries so small that the size, importance, and position of the church-towers cannot have been governed by their use as bell-towers, but rather by other considerations. In support of this we read in the account of the original plan for the Monastery of Saint Gall that the round towers were *ad universa inspicienda* for a general lookout. And even as late as the Twelfth and Thirteenth centuries there is an upper story in church-towers, above the belfry story, which is the 'crow's-nest,' where the watchman stands. Originally there were two ways of grouping the tower with the church: it was either a separate structure, as in the round and square towers of the Fifth and Sixth centuries at Ravenna; or it was part of the façade, like the one or two towers at the end or ends of the façade at Shakka, Turmanin, and other churches of Syria, also of the Fifth and Sixth centuries. The type of the separate tower prevailed in Italy in its *campanili;* the attached towers in the rest of Europe. The comparative freedom allowed in designing such structures, the rivalry in regard to their size and richness between monasteries, cathedrals, and even communities, make of the church-towers of the Romanesque and Gothic eras the most characteristic and finished product of each architectural school. For details see TOWERS.

There are several other terms in use for constructions supporting bells: *Belfry* (q.v.), which is either a civil bell-tower or the wooden frame supporting the bell; *bell-gable*, a flat piece of wall or gable pierced with an opening for a bell; *bell-cote*, a small steeple that does not break out much from the general design; *bell-turret*, usually octagonal or circular, and of high, slender proportions, on a small scale.

BELLUNO, bĕl-lo͞o′nō̇ (anciently *Belunum*). An episcopal city, capital of the Province of Belluno, in north Italy (Map: Italy, G 1). It is situated on a high tongue of land, formed by the confluence of the Ardo and the Piave, 72 miles north of Venice. Noteworthy among the 14 churches is the cathedral, modeled on the Palladium, and containing some excellent paintings. The campanile is 217 feet high. The chief manufactures are silk, straw, leather, and wax; the principal trade is in silk, lumber, wine, and fruit. Population, in 1881, 16,000; in 1901, 19,000.

BELLUNO, DUKE OF. See VICTOR, CLAUDE PERRIN.

BELL′WORT. See CAMPANULA.

BEL-MERODACH, bĕl mĕr′ō-dăk. See MERODACH.

BEL′MONT. A village in Mississippi County, Mo., on the Mississippi River, opposite Columbus, Ky., and on the Saint Louis, Iron Mountain and Southern Railroad (Map: Missouri, G 5). In the summer of 1861 Belmont became the site of a Confederate camp. On November 7 General Grant, then in command at Cairo, Ill., moved upon it with about 3000 troops, and after four hours of fighting captured and destroyed it. Meanwhile General Polk sent General Pillow with a Confederate reinforcement across the river, and Grant was forced to fight his way back to his transports. The total Confederate force engaged was about 7000. The losses in killed, wounded, and missing were, for the Federals, 485, and for the Confederates, 642.

BELMONT. A village and county-seat of Allegany County, N. Y., about 90 miles west by north of Elmira; on the Genesee River and on the Erie Railroad (Map: New York, B 3). It is the centre of an agricultural community, and has flour-mills, iron-works, machine-shop, etc. Population, in 1890, 950; in 1900, 1190.

BELMONT, AUGUST (1816-90). An American financier. He was born in Alzey, Germany; was for several years employed in the banking house of the Rothschilds at Frankfort and Naples, and removed to New York as their representative in 1837. He was consul-general for Austria from 1844-50, and in 1853 was appointed by President Pierce chargé d'affaires at The Hague, where he afterwards became Minister Resident, resigning in 1858. He was interested in politics, and was chairman of the National Democratic Committee from 1860 to 1872. He was prominent on the turf, and as a patron of art, and owned a fine collection of paintings.

BELMONT, CHARLES. A young man-about-town in Moore's play, *The Foundling*. He rescues a child from the hands of a villain, brings her up in his own home, falls in love with her, and eventually marries her. She is discovered, in the dénouement, to be the daughter of Sir Charles Raymond. Garrick achieved much success in the rôle.

BELMONT, PERRY (1851—). An American lawyer, son of August Belmont. He was born in New York, graduated at Harvard in 1872, and at the Columbia College Law School in 1876; was admitted to the bar, and practiced law in New York until 1881. He was a member of Congress as a Democrat in 1881-87; was chairman of the Committee on Foreign Affairs in

1885-87, and was United States Minister to Spain in 1887-88.

BELMONTET, bĕl′môɴ′tā′ Louis (1799-1879). A French poet and publicist. He was born at Montauban, of Italian parents, and was educated at the Lyceum of Toulouse. In consequence of several eulogistic verses written by him on Napoleon I. he was banished from Toulouse in 1819, and went to Paris, where he obtained a position as tutor. He later became one of the most ardent promoters of the Bonapartist propaganda, in which cause he in 1830 established the *Tribun du Peuple.* He was a member of the Legislature from 1852 until the fall of the Empire. His most celebrated poetic productions are: *Les tristes,* a collection of elegies (1824); *Le souper d'Auguste* (1828); *Une fête de Néron,* a tragedy performed more than 100 times at the Odéon in 1829.

BELOCH, bā′lōɢ, Julius (1854—). A German-Italian historian, born at Petschkendorf, near Lüben. He became professor in the University of Rome in 1879. His works include *Campien* (2d ed., 1890); *Der italische Bund unter Roms Hegemonie* (1880); *Die attische Politik seit Perikles* (1884); *Die Bevölkerung der griechisch-römischen Welt* (1886); *Storia greca,* 2 vols. (1893-97).

BELOIT′. A city and county-seat of Mitchell County, Kan., 185 miles west of Atchison; on the Solomon River, and on the Missouri Pacific and the Union Pacific railroads (Map: Kansas, D 2). It is the seat of the State Industrial School for Girls, and contains a fine county court-house. The city has a considerable trade in live stock, agricultural produce, grain, and flour, and contains several grain-elevators and flouring-mills. Population, in 1890, 2455; in 1900, 2359.

BELOIT. A city in Rock County, Wis., 91 miles northwest of Chicago, Ill.; on Rock River, and on the Chicago, Milwaukee and Saint Paul, and the Chicago and Northwestern railroads (Map: Wisconsin, E 6). It has paper-mills, foundries, and extensive manufactures of gasoline-engines, windmills, agricultural implements, woodworking and paper-mill machinery, scales, shoes, etc. Beloit has a public library, and is the seat of Beloit College (Congregational), organized in 1847. The first settler on the site of Beloit came in 1824, and a city charter was secured in 1856. The government, under a charter of 1896, is vested in a mayor, elected annually, and a municipal council. Population, in 1890, 6315; in 1900, 10,436.

BELOIT COL′LEGE, situated at Beloit, Wis. It was founded in 1847, graduates of Yale being prominent in its organization. The value of buildings and grounds is about $500,000, and the endowment amounts to $800,000, not all of which, however, is productive. The annual income is about $45,000. The number of volumes in the library is 28,000; in 1901 the faculty numbered 25 and the student-body 420, of whom 231 were in college classes, 179 in the academy, and the remainder in music. Aaron L. Chapin, D.D., LL.D., was president of the college from 1850 to 1886; Edward Dwight Eaton, D.D., LL.D., after 1886.

BEL′OMAN′CY. See Superstition.

BELON, be-lôɴ′, Pierre (1517-64). A French naturalist. He was born at Soulletière, studied medicine in Paris, and traveled extensively. In 1553 he published an account of his travels in a work entitled, *Les observations de plusieurs singularités et choses mémorables trouvées en Grèce, Asie,* etc., in 1551; *Histoire naturelle des étranges poissons marins,* etc.; and in 1555, *Histoire de la nature des oiseaux,* which is the most important treatise on ornithology of the Sixteenth Century. Belon paved the way for modern comparative anatomy.

BELOOCHISTAN, be-lo͞o′chē-stän′. See Baluchistan.

BE′LOSTOM′IDÆ. A family of predaceous water-bugs. See Fishkiller.

BELOT, be-lȯ′, Adolphe (1829-90). A French novelist and dramatist. He was born at Pointe-à-Pitre, Guadeloupe, November 6, 1829, and early began to devote himself to writing. He was a most prolific and a sensational author, and in addition to original plays, he dramatized, often in collaboration with others, nearly all of his own novels. Among his best-known novels are: *Le drame de la Rue de la Paix* (1867); *La Vénus de Gordes* (1867), in collaboration with Ernest Daudet; *Mademoiselle Giraud, ma femme* (1870); *La femme de feu* (1872); *La Vénus noire* (1878); and *Fleur de crime* (1881). His comedies, *Le testament de César Girodot* (1859), written with Edmond Villetard, *Les Maris à système* (1862), and *Les indifférents* (1863), were widely popular; but Belot will perhaps be longest remembered by his drama *Parricide* (1874), and the comedy *Sapho* (1885), written in collaboration with Alphonse Daudet. He died in Paris, December 17, 1890.

BELOVED DISCI′PLE, The. A name given to Saint John, called in John xiii. 23, "one of his disciples, whom Jesus loved."

BELOVED PHYSI′CIAN, The. A title of Saint Luke in Col. iv. 14.

BEL′PER (corrupted from Fr. *bel, beau,* beautiful + *repaire,* retreat). A market town of Derbyshire, England, on the Derwent, 7 miles north of Derby (Map: England, E 3). It is well built, in great part of gritstone, which is obtained in the neighborhood. Belper is, to a considerable extent, a town of recent growth, and owes its prosperity to the establishment of cotton-works there. There are also manufactures of silk and cotton hosiery, nails, and pottery. Belper was at one time the residence of John of Gaunt. Population, in 1891, 10,400; in 1901, 10,900.

BEL′PHEGOR (Gk. Βεελφεγώρ, *Beelphegōr,* for Heb. *Baal-Peor,* lord of Peor mountain). The name of an arch-demon who entered into a marriage with a mortal, but was not able to endure the society of the woman and fled. La Fontaine treated this subject in one of his *Contes,* and Wilson produced an English tragi-comedy, *Belphegor, or the Marriage of the Devil,* in 1691. Two other plays of this name have been brought out since. In the pantheon of the Moabites a deity of this name was worshiped with peculiarly disgusting rites.

BELPHŒ′BE (Fr. *belle,* fem. of *beau,* OF. *bel,* beautiful + Lat. *Phœbe,* Gk. Φοίβη, *Phoibē,* Diana). A character in Spenser's *Faerie Queene,* who sums up Elizabeth's womanly attributes. The virtues of the Queen are set forth under the other name of Gloriana.

BEL'SHAM, Thomas (1750-1829). An English Unitarian clergyman, one of the ablest expounders of that system of theology. He was born at Bedford, was educated in the principles of Calvinism, and was pastor of the Dissenting congregation and head of the theological academy at Daventry from 1781 to 1789, when he resigned, on embracing Unitarian views, and shortly after received the charge of a new theological academy at Hackney. After the collapse of that institution for want of funds in 1796, he took private pupils. In 1805 he removed to London as the successor of Dr. Disney, where he continued till his death, November 11, 1829. Most of his works are controversial; his doctrine regarding the person of Christ represents the purely 'humanitarian' view, as distinguished from the more nearly Arian sentiments of men like Channing. He published also a work on mental and moral philosophy, following Hartley, and a memoir of his predecessor, Theophilus Lindsey (1812, reprinted Boston, 1873). Consult *Memoirs*, ed. by J. Williams (London, 1883). His brother, William (born 1752; died 1827), was an active and voluminous writer of history and political tracts on the side of the Whigs. He wrote *History of Great Britain from 1688 to 1820* (London, 1805-24; 14 vols.).

BELSHAZ'ZAR (Babylon. *Bel Shar-uṣur,* O Bel, protect the king; from *Shar,* lord, king + *uṣur,* to protect). According to the Book of Daniel (chap. v.), the son and successor of Nebuchadnezzar, and the last King of Babylon, who was slain, the Empire passing into the hands of Darius, the Mede. He is warned of his doom by a mysterious handwriting that appears on the wall of his palace. Those who accept the results of the modern biblical criticism assert that the Book of Daniel was composed in the Second Century B.C. This being granted, then it is hardly astonishing that in a composition made several centuries after the fall of Babylonia historical events should have become confused in the mind of a writer who merely introduces Babylonian personages as a disguise, and is interested, not in Babylonian but in Hebrew events. As a matter of fact, the last King of Babylonia was Nabonidus, in the seventeenth year of whose reign (B.C. 538) Babylon was taken by Cyrus. The inscriptions of Nabonidus, however, make mention of a son, Bel-shar-usur, and this name also occurs as that of the son of Nabonidus in several contract tablets, and since, in an inscription of Cyrus, 'a son of the King' is spoken of as in control of the army in northern Babylonia, it is reasonable to conclude that Bel-shar-usur was associated with his father in the government. Thus the tradition could arise which would make him the actual last King of Babylonia. The association of Belshazzar with Nebuchadnezzar rests upon a further confusion which can be easily accounted for, if it be borne in mind that a Jewish writer of the Second Century B.C. would not be at great pains to distinguish one Babylonian king from another. Nebuchadnezzar, as the destroyer of Jerusalem, was the chief representative, in the eyes of a Jewish writer, of the Neo-Babylonian monarchy, and so appears throughout the Book of Daniel.

BELT (AS. *belt,* allied with OHG. *balz,* Lat. *balteus,* girdle, belt). In engineering, a flexible cord or band passing about the periphery of wheels or drums for the purpose of transmitting motion or power from one to another. Commonly the name 'belt' is given only to broad, flat bands of leather, rubber, or woven fabric; ropes, chains, etc., although serving similar purposes, being classed separately. (See Power, Transmission of.) The best leather belts are made from the back strips of all oak-tanned leather, curried with the use of cod-oil and tallow. Such belts have continued in use for thirty years when employed as simple driving-belts, driving a proper amount of power, and having had suitable care. To form the lengths of leather into the long endless belt, they are connected end to end by lacing, riveting, or cementing and lacing. The strength of leather belts in the body of the belt is from 2000 to 5000 pounds per square inch; at the joints only about from 1000 pounds to 1500 pounds, for lacing, and from 1000 pounds to 2500 pounds for riveted joints; the safe working strain is taken generally at not over one-third the strength at the joint. Leather belts should be protected from steam, vapor, water, oil-drippings, and moisture, and should not be submitted to a heat of over 110° F. They are usually run with the grain side next to the pulleys, since this side stands the wear better, and also because the flesh side is stronger and the part least subjected to wear. This arrangement gives the belt longer life and greater propelling power. Leather-chain or leather-link belting consists of short sections of leather joined by metal rivets. Rubber belts are made of two or more layers of canvas connected together with a rubber composition, and then heated until the rubber vulcanizes. The advantages claimed for rubber belting are perfect uniformity in width and thickness; ability to endure greater degrees of heat or cold safely; less danger of injury from moisture and steam vapor; great durability and strength, and greater adhesion to the pulleys than is afforded by leather belting. Grease rapidly deteriorates and destroys rubber belts. Besides leather and rubber belting, there are quite a variety of woven-fabric belts employed. Cotton, hair, and most of the more common textile fibres are used for manufacturing them. Transmission of power by belts is more common in the United States than in European countries, but of late years there has been an increase in the use of belts outside of the United States. The great favor with which power-transmission by belting is received in the United States is due to the fact that the belt is elastic and will slip without injury to the machinery if unduly strained. Ordinarily, flexible belts transmit power by the friction between them and their pulleys. The pulley which communicates motion is the driving-pulley; that which receives, the driven pulley; that part of the belt which runs from the driven pulley to the driver is the driving part of the belt, since it is pulled by the driver, and in turn pulls on the driven pulley; the part of the belt which runs from the driver to the driven pulley is the slack belt. If the pulley is higher at one side than at the other, the belt will creep toward the highest part; for this reason the surface of the pulley is usually not made cylindrical, but of greater diameter at the centre. If this be overdone, the belt does not pull, except along its central part. The pulleys usually lie in the same plane, and with their axes parallel; but this is not necessary, provided that the course of each part of the belt—the driving and the slack part alike—lie in the plane of the pulley toward which that part of the belt runs; the belt being always delivered by one pulley into the plane of the other.

Belts are made in a great variety of sizes, some of them being very large. As extreme cases, may be noted: A leather belt of the New Jersey Zinc Works, 4 thicknesses, 48 inches wide, and 102 feet long; a rubber belt in Chicago, 6-ply, 48 inches wide, and 320 feet long; a leather belt for a paper-mill in Wilmington, Del., 60 inches wide and 186½ feet long. For a summary of modern practice in the calculation, operation, and care of belts and belting, consult Kent, *Mechanical Engineer's Pocket-Book* (New York, 1900).

BELT, Great and Little. Names given to the two straits of eastern Denmark which, with the Sound, connect the waters of the Kattegat with the Baltic (Map: Denmark, C and D 3). The Great Belt, which includes the Store Belt and the Langeland Belt, is about 70 miles long, and varies from 8 to 20 miles in width, in fact broadening to 30 miles toward the south in Vordinborg Bay; it separates Seeland and Laaland on the east from Fünen and Langeland on the west. The Little or Lille Belt, which is shallow, is about 50 miles long, and varies from less than a mile in width at the north to an extreme width of 30 miles, its average width being less than 10 miles; it separates Fünen on the east from Jutland and Schleswig on the west. Both straits are dangerous to navigate on account of currents and sand-banks; the smaller one is little used.

BEL′TANE (Scottish Gael. *Bealltainno*), **BELLTAINE**, or **BELTINE**. A pagan Celtic festival, traces of which have survived to this day. The name is still used for May-day in Gaelic Scotland. The etymology and original meaning are uncertain. "Cormac's Glossary," an Irish text of the Tenth Century, contains the earliest mention of the institution (spelled *belltaine* and *beltine*), and two different explanations are there given of its meaning. In one place it is said to mean 'lucky fire,' and in another 'fire of Bel,' who is declared to be 'an idol god.' The second of these interpretations has been commonly accepted, but without any sufficient evidence. The identification of *bel-* as the name of a god is doubtful, and even the connection between the second element and Irish *teine*, 'fire,' is open to question. In any case, however, the Semitic Baal has nothing to do with the matter.

Cormac's description of Beltine is very brief. He simply says that the Druids used to make two fires with great incantations, and drive their cattle between them as a safeguard against disease. This custom of driving domestic animals through fire is still known in Brittany and the islands of Arran; and in certain May-day festivities it was practiced until recently in Scotland. A young man, selected by a prescribed ceremonial, was similarly compelled to leap three times through fire. Both these ceremonies look like symbolical sacrifices, and there may have been a time when the victims were actually burned. The whole set of observances, like the German *Johannisfeuer* at the summer solstice, is usually explained (and doubtless correctly) as a branch of sun-worship.

Consult, for the statement in Cormac, *Glossary*, the edition by O'Donovan and Stokes (London, 1862); for the Scottish Beltane, Jamieson, *Scottish Dictionary* (Edinburgh, 1808); for the significance of the ceremonies, A. Bertrand, *La religion des Gaulois* (Paris, 1897). Rhys makes some comparisons with the Athenian Thargelia in his *Hibbert Lectures* (London, 1887).

BEL′TON. A city and county-seat of Bell County, Tex., 80 miles north by east of Austin, on the Leon River, and on the Missouri, Kansas and Texas and the Gulf, Colorado and Santa Fe railroads (Map: Texas, F 4). It has a county court-house and jail buildings, and is the seat of Baylor Female College (Baptist), opened in 1845. Building-stone, quarried in the vicinity, and cotton constitute an extensive export trade, and among the industrial establishments are cotton, cotton-seed oil, and flour-mills, foundries, lumber-yards, marble-works, brick-yard, and several other plants. Population, in 1890, 3000; in 1900, 3700.

BELTRAFFIO, bĕl-träf′yō, or **BOLTRAFFIO**, Giovanni Antonio (1467-1516). An Italian painter, born in Milan. He was a pupil of Leonardo da Vinci, worked as an amateur, and ably imitated Leonardo in color and breadth of treatment. His authentic works are extremely rare. Among them are: "Madonna of the Casio Family" (Louvre Gallery), a portrait in the Ambrosian Library, Milan, and two at Isola Bella.

BELTRAME, bĕl-trä′mā, Giovanni (1824—). An Italian philologist and missionary, born at Valeggio, in northern Italy. In 1854 he was sent to Khartum and Fazogl by an Austrian missionary society, and in 1858 he accompanied Knoblecher to the newly established missionary station, "Holy Cross" on the White Nile. He returned to Europe in 1862. The following are his principal publications: *Grammatica della lingua Denka* (1880); *Vocabolario, Italiano-Denka e Denka-Italiano* (1880); *Il Sennaar e lo Sciangallah* (1879); *Il fiume bianco e i Denka* (1882); *In Palestina* (1895).

BELTRAMI, bĕl-trä′mē, Eugenio (1835-1900). An Italian mathematician. He was born at Cremona, and taught mathematical physics at the University of Rome, and at several other Italian universities. The Lincei, a celebrated academy of Rome, honored Beltrami by electing him president. His contributions to mathematics are largely on the subject of non-Euclidian geometry. (See Geometry.) He reached the remarkable conclusion that the propositions of non-Euclidian geometry relate to figures lying upon surfaces of constant negative curvature. The conclusion that on surfaces of constant curvature there are three geometries—the non-Euclidian on a surface of constant negative curvature, the spherical on a surface of constant positive curvature, and the Euclidian on a surface of zero curvature—rests upon the researches of Beltrami, Helmholtz, and Riemann. Thus Beltrami has taken a conspicuous part in laying the foundation of modern geometry. The most important among his numerous essays is the monograph, "Saggio di interpretazione della geometria non-euclidia," published in the *Giornale di Matematica VI.* (Rome). The following theorem is known as Beltrami's: "The centre of a circle circumscribing a triangle is the centre of gravity of the centres of its inscribed and escribed circles." Besides his work in pure mathematics, his contributions to mathematical physics deserve mention, his original publications in the latter field including papers on electricity and magnetism, elasticity, etc.

BELTRAMI, Giovanni (1779-1854). An Italian lapidary, born at Cremona. With the exception of a preliminary course with Giacomo Guerrini he was self-taught. His fine work secured for him a patron in Eugène Beauharnais, for whom he executed sixteen cameos, representing episodes from the story of Psyche. At the request of the Empress of Austria he prepared, in 1815, a cameo portrait of her father, the King of Bavaria, and ten years afterwards a similar portrait of her husband, Francis I. Such was his skill that on one occasion he reproduced "The Lord's Supper," by Leonardo da Vinci, upon a single topaz.

BELUCHISTAN, be-lo͞o′chė-stän′. See Baluchistan.

BELU′GA. See White Whale.

BELUGA, or **BIELAGA** (Russ. *byeluga*, from *byely*, white). A Russian sturgeon. See Sturgeon.

BE′LUS (Lat., Gk. *βῆλος*, *Bēlos*). (1) A son of Poseidon, father of Ægyptus and Danaus, and King of Phœnicia. The name is also borne by the unhappy Dido's father, the King of Tyre, and by the King of Lydia, the father of Ninus. Etymologically related to *Baal*, the name Belus is thought by some to be that of the common progenitor of various Eastern peoples, or at least of their ancestral hero and deity. It seems more certain that the Assyrian Bil, the Old Testament Bel, of Babylon, is not identical with the Baal of the Old Testament, but is in his attributes far superior to that deity as he is known among the Phœnicians, Syrians, etc. (2) Belus is also the name of a Syrian river, on the banks of which glass-making was invented, and which empties into the Mediterranean near Acre. Its modern name is Nahr Naaman.

BELVEDERE, bĕl′vȧ-dā′rȧ. Cortile del. A court in the Vatican, about which are placed some of the most famous works of ancient sculpture—the Torso of Hercules, the Laocoön, the Apollo Belvedere, and the Sarcophagus of Lucius Cornelius Scipio Barbatus.

BELVEDERE, bĕl′vė-dēr, *It. pron.* bĕl′vȧ-dā′rȧ (It. *bel*, beautiful + *vedere*, to see: a view). An Italian term meaning originally an erection like a loggia on the top of a house, or a detached summer-house or terrace set upon an eminence, for the purpose of commanding a view. It is also sometimes used of a large inclosed—usually glassed-in—structure: for example, that part of the Vatican Palace (q.v.) in Rome known as the Belvedere, which is now part of the sculpture gallery. The name was also given to the entire palace of Prince Eugène in Vienna.

BELVIDERE, bĕl-vĭ-dēr′. A city and county-seat of Boone County, Ill., 78 miles west by north of Chicago; on the Kishwaukee River, and on the Chicago and Northwestern Railroad (Map: Illinois, D 1). It contains a public library, city park, and a fine opera-house, court-house, and county-record building. The city is noted as a manufacturing centre, producing extensively sewing-machines, bicycles, automobiles, boilers, condensed milk, butter, screen doors, flour, etc. It is surrounded by a fertile agricultural district, and has important dairying interests. Settled in 1836, Belvidere was incorporated first in 1857. The government is administered under a charter of 1881, which provides for a mayor, elected every two years, and a city council. The water-works are owned and operated by the municipality. Population, in 1890, 3867; in 1900, 6937.

BELVIDERE. A town and county-seat of Warren County, N. J., 95 miles north of Philadelphia, Pa.; on the Delaware River, and on the Pennsylvania and other railroads (Map: New Jersey, B 2). It derives good water-power from Pequest Creek, which here empties into the Delaware, and is the seat of a considerable milling industry. Population, in 1890, 1768; in 1900, 1784.

BEL′VILLE. A character in Garrick's *The Country Girl*, and an adaptation of Wycherley's comedy *The Country Wife*.

BELZONI, bĕl-zō′nė, Giambattista (1778-1823). An Italian explorer and archæologist. He was born in Padua, and was educated in Rome for the priesthood; but, having a natural inclination for mechanics, and especially hydraulics, he abandoned his theological studies and returned to Padua when Rome was occupied by the French troops. He went to Holland in 1800, and to England in 1803. There he lived for nine years in great poverty, being often compelled to earn a living by giving athletic performances at the theatre. He traveled to Spain, Portugal, and Malta, and in 1815 went to Egypt in order to construct a hydraulic engine for Mohammed Ali. In Egypt he met Burckhardt and Salt, through whose advice and encouragement he began the exploration of Egyptian antiquities. In 1817 he cleared away the sand from the entrance to the great rock-hewn temple of Abu Simbul (q.v.), and in the same year discovered the finest of the royal tombs (that of Seti I.) at Thebes. It is still known as 'Belzoni's tomb.' At Gizeh he found the entrance to Khafra's Pyramid (1818), and made the first thorough examination of the great pyramids. He also explored the desert between the Red Sea and the Nile, and visited the oasis of Siwa. The discovery of the ancient emerald mines at Gebel Zabara is often ascribed to him, but erroneously, as the place had previously been visited by Bruce and Cailliaud. Belzoni engraved his name upon many ancient monuments in commemoration of his discoveries.

In 1819 he returned to Italy, and thence to England, bringing with him, for exhibition and for sale, a valuable collection of antiquities; among them the splendid alabaster sarcophagus of Seti I. (now in the Kensington Museum), and the upper half of a colossal statue of Rameses II. (now in the British Museum), found at the Ramesseum. Two years later he published his *Narrative of the Operations and Recent Discoveries Within the Pyramids, Temples, Tombs, and Excavations in Egypt and Nubia, and of a Journey to the Coast of the Red Sea in Search of the Ancient Berenice, and Another to the Oasis of Jupiter Ammon* (London, 1821). In 1822 Belzoni undertook a journey to Timbuktu, in Central Africa, but was attacked by dysentery at Benin, and died at Gato, December 3, 1823. Belzoni's skill as a draughtsman was of great service to him in his archæological investigations. His fine drawings of the royal tombs at Thebes were published in 1829 by his widow.

BEM, Jozef (1795-1850). A Polish revolutionist and Hungarian patriot. He was born at Tarnow, in Galicia, fought under Napoleon in the campaign of 1812, and entered the Polish Army, serving till 1825. He distinguished himself in the Polish revolution of 1830-31, rising to the position of commander-in-chief of the artillery. On the collapse of the revolution he took refuge in France. He took a prominent part in the insurrection of October, 1843, in Vienna. He succeeded in escaping and joined the Hungarians. He was intrusted with the command of the Army of Transylvania, amounting to 8000 or 10,000 men. Checked at first, he defeated the Austrians at the Bridge of Piski, and finally succeeded, in March, 1849, in driving both them and their Russian allies into Wallachia. After expelling the troops under Puchner from the Banat, Bem, with his army increased to 40,000 men, returned into Transylvania, where the Russians had defeated the Hungarians. Here he endeavored unsuccessfully to prevent the union of the Russians with the Austrians. On July 31 he was defeated by vastly superior forces at Schässburg. At Kossuth's request he now hastened into Hungary, where he took part in the battle near Temesvar. Retreating into Transylvania, he there defended himself for some days against overwhelming numbers, and then made his escape into Turkey. There he embraced Islam, took the name of Amurath Pasha, and received a command in the army. He was wounded while suppressing an anti-Christian riot at Aleppo. He died there of the fever. Bem was a man of unselfish character, of great zeal and devotion, and possessed fine military talents. He wrote a work on mnemonics, the *Exposé général de la methode mnémonique polonaise*, etc. Consult: N. N. Lajos, *Le général Bem* (Paris, 1851); Czetz, *Bems Feldzug in Siebenbürgen* (Hamburg, 1850).

BE'MA (Gk. *βῆμα*, *bēma*, a step, raised place). The sanctuary of a church, so called by the Greek Church because the sanctuary end was raised above the rest of the pavement. •It begins at the outer edge of the choir, and is separated from the body of the church by the *iconostasis* or reredos, or choir-screen. See Chancel; Choir; Church.

BEM'BA. See Bangweolo.

BEMBERG, bäɴ'bâr', Henri (1861—). A French composer and conductor, born in Paris. He studied at the conservatory of that city, among his teachers being Dubois, Franck, and Massenet. He is widely known by many successful songs and piano compositions, but in France is chiefly recognized as a dramatic composer. His principal works are *Le baiser de Suzon*, a one-act opera, which met with but moderate success when first presented at the Opéra Comique, Paris, in 1888, and the more ambitious and successful four-act *opéra-légende*, *Elaine*, which was first heard at Covent Garden Theatre, London, in 1892, and afterwards in New York (1894).

BEMBICIDÆ, bĕm-bĭs'ĭ-dē (Neo-Lat., from Gk. *βέμβιξ*, *bembix*, a spinning-top, a buzzing insect, probably from the loud, whirring sound which accompanies their flight). A family of fossorial Hymenoptera, which, with the Sphecidæ, are popularly known as sand-wasps (q.v.).

BEM'BO, Pietro (1470-1547). One of the most celebrated Italian scholars of the Sixteenth Century. He was born in Venice, May 20, 1470. Having studied at Padua and Ferrara, he early devoted himself to polite literature. He edited the Italian poems of Petrarch, printed by Aldus in 1501, and the *Terze rime* of Dante (1502). In 1506 he proceeded to the Court of Urbino, where he resided until 1512, when he went to Rome, where he was made secretary to Pope Leo X. On the death of that Pope, Bembo returned to Padua, where he became a liberal patron of literature and the arts, as well as a fertile writer himself. In 1529 he accepted the office of historiographer to the Republic of Venice, and was also appointed keeper of Saint Mark's Library. In 1539 Bembo, who had taken only the minor ecclesiastical orders, was unexpectedly presented with a cardinal's hat by Pope Paul III., who afterwards appointed him to the dioceses of Gubbio and Bergamo. He died January 18, 1547. Bembo united in his character all that is amiable. He was the restorer of good style in both Latin and Italian literature. His taste is said to have been so fastidious with regard to style that he subjected each of his own writings to forty revisions previous to publication. Some of his writings are marred by the licentiousness of the time. Among his works may be mentioned the *Rerum Veneticarum Libri XII.* (Venice, 1551), of which he published an Italian edition (Venice, 1552); his *Prose*, dialogues in which are given the rules of the Tuscan dialect; *Gli Asolani*, a series of disputations on love, etc.; *Rime*, a collection of sonnets and canzonets; his letters, Italian and Latin; and the work *De Virgilii Culice et Terentii Fabulis*. His collected works were published at Venice, in 4 volumes (1729). Consult Symonds, *Renaissance in Italy*, Vol. II. (London, 1881).

BEM'BRIDGE BEDS. A division of the Oligocene Tertiary formation, well developed around Bembridge, on the Isle of Wight, England. The rocks of this division aggregate 140 feet in thickness, and consist of fresh-water, estuarine, and marine marls, and fresh-water limestones; they are highly fossiliferous. The Bembridge limestone, which is the lower member of the group, contains, besides large numbers of fresh-water mollusks, remains of the mammalian genera Anoplotherium, Anthracotherium, Palæotherium, etc., and is considered to be the equivalent of the Montmartre gypsum-beds near Paris, and of the Uinta group of Colorado and Wyoming.

BE'MIS, Edward Webster (1860—). An American political economist. He was born in Springfield, Mass., and graduated at Amherst College in 1880. He was professor of history and political economy at Vanderbilt University (1889-92), associate professor of political economy at the University of Chicago (1892-95), assistant statistician of the Bureau of Labor Statistics for the State of Illinois (1896), and professor of political science at the State Agricultural College, Kansas (1897-99). In 1900 he was made director of the department of municipal monopolies in the Bureau of Economic Research, New York. He has published the works entitled *Municipal Monopolies* (1899) and *Municipal Ownership of Gas-Works in the United States* (1891), and is a frequent contributor to magazines on the subjects of municipal government, trusts, trades-unions, and monopolies.

BEMIS HEIGHTS. See Saratoga, Battles of.

BEMMEL, bĕm'mel, Peter von (1685-1754). A German painter, son of Wilhelm von Bemmel (1630-1708). He was born at Nuremberg, and was educated by his father, from whose style, however, he afterwards departed. He was employed principally by Franz Konrad von Stadion, Prince-Bishop of Bamberg, whose palace-walls he adorned. He manifested a marked predilection for thunderstorms and winter landscapes. Many of his pictures are at Bamberg and Brunswick. He was, after his father, the most prominent representative of the Bemmel family, fourteen members of which have achieved distinction as artists.

BEN. The Hebrew word for 'son,' used as a prefix to names—e.g. Benhadad, the son or worshiper of Hadad, the chief deity of the Syrians; Benjamin, son of the right hand, etc. (1) The plural, *Bene,* is used to indicate a combination of families into a clan or tribe, or of clans into a confederation — Bene Ammon, Bene Israel. (2) In Arabic, one finds the corresponding word *Ibn* similarly used, which sometimes appears modified in European languages as Ebn, Aben, or Aven. Its plural, *Beni*, is found in the names of many Arab tribes—as Beni Omayyah, the sons of Omayyah, the family known in history as the Ommiads; and sometimes in the name of places—as Beni-Hassan.

BEN, BEINN, or **BHEIN.** A Gaelic word signifying mountain or mountain-head. It is prefixed to the name of a great many mountains in Scotland—as Ben Nevis, Ben Macdhui, Ben Cruachan, etc. The corresponding term in various parts of Europe is *Pen*, which is found in many of the names in Cornwall and Wales, in the Pennine Alps, and also in the word Apennines, and probably the Cévennes of France.

BEN, Oil of (Ar. *bān*, name of the tree). A fixed oil used in perfumery in extracting the fragrant principles of various plants. It is itself odorless, and does not readily decompose. It is obtained by expressing the seeds (called *ben* or *ben nuts*) of several species of Moringa, a genus of trees growing in northern Africa, Arabia, and the East Indies. The ben-oil of commerce is derived mainly from the *Moringa aptera.*

BENA'CUS, Lacus (Lat., Benacus Lake). The Roman name of the Lake of Garda (*Lago di Garda*), a long stretch of water in Venetian territory, which in 1859 formed part of the boundary line between Austria and Italy.

BENALCÁZAR, bā'nȧl-kä'thär, Sebastian de, properly Sebastian Moyano (c.1499-1550). A Spanish conqueror, born in Benalcázar, Estremadura. He accompanied Pedrarias to Darien in 1514, came to stand high in the confidence of Francisco Pizarro, and in 1533 defeated the Peruvian Army on the Plains of Riobamba and took the city of Quito. Subsequently he proceeded to the invasion of Popayan, a region comprising the southwestern portion of the present Colómbia. He was appointed governor of Popayan Province in 1538.

BÉNARD, bȧ'när', Henri Jean Emile (1844—). A French architect, born at Goderville. He studied at the Ecole des Beaux-Arts in Paris, and was awarded the Prix de Rome in 1867. Upon his return from Rome he settled in Havre, and remained there until 1888, when he went to Paris. He executed several buildings there for the Government, notably the Palace of Compiègne. He entered the international competition for permanent plans for the University of California, and gained the first prize over a hundred competitors. These plans were exhibited at the Architectural League in 1900. They call for a $10,000,000 building. With some slight changes, Bénard's drawings were adopted.

BENARES, be-nä'rēz. A division in the Northwest Provinces of British India. Area, 10,423 square miles; population, in 1891, 5,368,600; in 1901, 5,032,500.

BENARES (Skr. *Vāraṇāśī*, from *Vāraṇa*, modern stream *Barna* + *aṣī*, rivulet; its ancient Skr. name was *Kāçī*). The holy city of the Hindus, capital of the Benares division, Northwest Provinces, British India, situated on the left side of the Ganges, which here varies, according to the season, between 50 and 90 feet in depth, and in width between 600 yards and a little more than half a mile (Map: India, D 3). Since 1887 the river has been spanned at Benares by the Dufferin Railway Bridge, 3518 feet long. The city is in latitude 25° 17' N. and longitude 83° 4' E., 421 miles northwest of Calcutta, and 466 and 74 miles respectively southeast of Delhi and Allahabad. Without reckoning Secrole, which is distant 2 or 3 miles to the westward, and contains the official establishments and European residences, Benares covers an amphitheatre of 3 miles in front and 1 mile in depth on the immediate margin of the river, which is comparatively steep, being chiefly occupied by 47 flights of steps, or ghats, where crowds of all classes spend the day in business, amusement, or devotion. Backed by the minarets of about 300 mosques, and the pinnacles of about 1000 pagodas, this scene presents a picturesque appearance to spectators on the opposite shore of the Ganges. On closer inspection, however, the city, as a whole, is disappointing. The streets, or rather alleys, impracticable for carriages, barely afford a passage to individual horsemen or single beasts of burden; and these thoroughfares, besides being shut out from sun and air by buildings of several stories, are shared with the sacred bulls that roam about at will. As the central seat of Hinduism, Benares, on festive occasions, attracts immense crowds of pilgrims—sometimes as many as 100,000.

In the traditions of the country, Benares is believed to have been coeval with creation; and tolerably authentic history assigns to it a high antiquity. In its actual condition, Benares is a modern city. In extent and in embellishment, it owes much to the influence of Mahratta ascendency, and it possesses, perhaps, not a single structure that reaches back to the close of the Sixteenth Century.

On the Sanskrit College, instituted in 1792, there was at a later date ingrafted an English department, comprising poetry, history, mathematics, and political economy, and the institution, now known as the Queen's College, occupies a modern building of Perpendicular architecture. It is attended by numerous Hindus, and a few Mussulmans and native Christians. Benares is industrious and wealthy, as well as holy. Besides extensive manufactures in cotton, wool, silk, and ornamental brass-work, its commanding position on the grand line of communication—road, river, and rail alike—renders it the principal emporium of the neighboring regions. It is the great mart for the shawls of the north, the diamonds of the south, and the muslins of the east; while it circulates the varied productions of Europe and America over Bundelkhand, Gorakhpur, Nepal, etc. The municipal institutions include a hospital, dispensaries, asylums for lunatics, lepers, and blind people, jail, swimming-bath, fine public gardens, and water-works. Population, in 1891, 219,500; in 1901, 203,100. Benares was ceded to the East India Company in 1775. The fanatical character of the inhabitants added its share of anxiety to the mutiny of 1857, but a rising was promptly suppressed, and the population was kept in check by the frequent passage of troops from Calcutta to the north. Consult: Sherring, *Sacred City of the Hindus* (London, 1869); Ralph, "The Sacred City of the Hindoos," in Vol. C. *Harper's Magazine* (New York, 1900).

BEN BOLT. A song by Thomas Dunn English (1843), first published in the New York *Weekly Mirror*, and widely reprinted. It owed its popularity largely to the old German air to which it was set. The song was revived in recent years through figuring in the extraordinarily successful *Trilby* of Du Maurier.

BEN'BOW, JOHN (1653-1702). A famous English admiral. He was born at Shrewsbury; entered the navy in 1678, and first distinguished himself as captain of a merchantman, in a bloody action with Sallee pirates in 1686. He attracted the notice of James II., who gave him a commission in the navy. After the Revolution he obtained the command of a large ship, and in the course of a few years was made rear-admiral by William III. The most memorable of this gallant sailor's exploits was his last, where his stubborn valor contrasted nobly with the dastardly behavior of his captains. Off Santa Marta, in the West Indies, on August 19, 1702, he came up with a superior French force under Admiral Du Casse. For four days he kept up a running fight with the enemy, almost deserted by the rest of his squadron. On the morning of the 24th his right leg was smashed by a chain-shot. His officers condoled with him. "I had rather have lost them both," said the sturdy admiral, "than have seen this dishonor brought upon the English nation. But, hark ye—if another shot should take me off, behave like men, and fight it out!" As soon as his wound was dressed, he was carried to the quarter-deck, and directed the fight while it lasted. The enemy sustained severe loss; but the infamous cowardice of the other captains, who refused to obey the admiral's signals, made the contest hopeless, and Benbow sailed away to Jamaica. He died of his wound on November 4. The recusant officers were tried by court-martial, and two captains were shot. Benbow's employment of explosive vessels at Saint Malo seems to have been an anticipation of Lord Dundonald's method at Basque Roads. Consult Fletcher, "Admiral Benbow," in *Macmillan's Magazine*, Vol. LXXXIV. (London, 1901).

BENCH. As a legal term, originally, the seat occupied by judges when holding court; later, the court or tribunal itself; and, then, the judges as a class, in contradistinction to the bar. The Court of Common Bench is another name for the Court of Common Pleas. The *King's Bench* (called the Queen's Bench during the reign of a queen) was formerly the highest court of common law in Britain. During the Commonwealth it was known as the *Upper Bench*. It is now included in the High Court of Justice. See COURTS; CURIA REGIS; KING'S BENCH.

BENCH, BENCH-MARK. A mark made on some permanent body and used in tidal observations and leveling surveys. The bench is an assumed datum-level to which the reading of the tide-gauge is referred. A *bench-mark* is a reference mark made upon some durable material, as the stone foundation of a building or a pier; its height above the zero of the tide-gauge or other datum-plane is determined and made a matter of record, so that by its means any desired level which has been once determined may be reëstablished. In tidal observations, a bench-mark should be made and its height above the zero of the gauge ascertained as soon as the latter is put up; should the gauge then be injured or destroyed before the completion of the observation, it may, by means of the bench-mark, be set up again with its zero at the same level as before; and, if renewed observations are desired after a lapse of time, the bench-mark enables them to be referred to the original plane of reference. In the ordinary leveling of the engineer or surveyor bench-marks are extensively employed and all levels measured are referred to them. See LEVELING.

BENCH'ERS. The name given to the governing bodies of the four great law societies of England—Inns of Court, Lincoln's Inn, Inner Temple, and Middle Temple. They are generally King's counsel or barristers of distinction. They have the entire management of the property of their respective inns and the power of punishing a barrister guilty of misconduct, or may disbar him, and they may refuse a student admission to the bar. Their presiding officer is called the *treasurer*. He is elected annually, and takes the chair at their corporate meetings, speaking and acting in their name. See INNS OF COURT.

BENCH WAR'RANT. In England, a warrant issued by a court of record for the arrest of a person who has been indicted, or against whom articles of the peace have been exhibited. If it proceeds from a court of assize it is signed by one judge; if from quarter sessions, by two justices of the peace. It is rarely used now. In the United States its use, its form, and the officer by whom it may be issued are regulated by statute frequently. In some States it may be issued by the clerk of the court, or by the district attorney. It is also employed in some jurisdictions for the arrest of one guilty of contempt of court.

BENCZUR, bĕn'tsōōr, GYULA (JULIUS) (1844—). A Hungarian painter. He was born at Nyiregyháza, and studied with Hiltensperger, Anschütz, and Piloty. In 1880 he became professor at the Academy of Munich, and afterwards became director of the Academy of Budapest. Benczur is, perhaps, the most faithful disciple of Piloty. His paintings show originality of conception and splendid coloring. The following are among the most noteworthy examples of his art: "Farewell of Ladislas Hunyady" (1867; Museum of Budapest); "Arrest of Rákóczy in 1701" (1869; Rumanian Court); "Louis XV. in the Boudoir of Dubarry;" "Family of Louis XVI. during the Assault on Versailles" (1872; D. O. Mills, New York); "Baptism of Saint Stephen" (1875; Museum of Budapest); "Bacchanti" (1881); "The Reconquest of Buda by Charles of Lorraine" (1888; Museum of Budapest).

BEND (OF. *bende*, *bande*, Fr. *bande*; cf. Eng. *band*). One of the honorable ordinaries, or more important charges in heraldry (q.v.).

BENDA, bĕn′dȧ, Franz (1709-86). A German violin virtuoso and teacher. He was born at Alt-Benatek, Bohemia, and studied with Löbel, Konieck, and Graun. He joined the orchestra of the Crown Prince—afterwards Frederick the Great—with whom he played about 50,000 concertos during a period of forty years. He was considered one of the best performers of his day.

BENDA, Georg (1722-95). A German musician. He was born at Jungbunzlau, Bohemia, and studied with his father, Hans Georg Benda. He became kapellmeister to Duke Frederick III. of Saxe-Gotha in 1748, and in 1764 went to Italy at the Duke's expense for the purpose of study. He returned to Gotha in 1766, and devoted himself to composition, writing, in all, about ten operas, several operettas, and the stirring melodramas *Ariadne auf Naxos*, *Medea*, *Almansor*, and *Nadine*. In 1778 he resigned his position and visited Hamburg, Vienna, and other cities, and finally settled at the little hamlet of Köstritz. The important place which he holds in the history of German opera is due to his introduction of the music-drama with spoken text. In other words, he was the originator of the pure melodrama, in which the whole musical part is confined to the orchestra, while the dialect is spoken.

BENDAVID, bĕn-dä′vĭt, Lazarus (1762-1832). A German-Jewish philosopher and mathematician. He was born in Berlin, studied at Berlin and Göttingen, and for a number of years lectured very successfully in Vienna in exposition of the Kantian philosophy. Expelled thence by a general decree against foreigners, he continued to lecture and write in Berlin. His publications include *Versuch über das Vergnügen* (1794); *Vorlesungen über die Kritik der reinen Vernunft* (1795); *Vorlesungen über die Kritik der praktischen Vernunft* (1796) and *Ueber den Ursprung unserer Erkenntnis* (1802).

BENDEMANN, bĕn′de-mán, Eduard Julius Friedrich (1811-89). A German painter. He was born in Berlin of Jewish parents December 3, 1811, and went, at sixteen years of age, to study in Düsseldorf. In 1828 he painted a portrait of his grandmother which attracted some attention. He went to Italy in 1830, and remained a year. On his return he began his first great picture, "The Jews Mourning in Exile," which was exhibited in the following year at Berlin, and, as the work of a youth of twenty-one, created a sensation. It is now in the Museum at Cologne. With it may be classed two other important pictures on kindred subjects, "Jeremiah amid the Ruins of Jerusalem" (1837) and "The Departure for Exile" (1872). Bendemann went to Dresden in 1838, as professor of painting at the Academy, and was soon commissioned by the King of Saxony to decorate some of the principal rooms in the royal palace there. For the throne-room he designed a frieze painted on a gold background running around the room, intended to show the whole of human life, from birth to death, in one continuous design. He also executed for this hall four large historical pictures from the life of Henry the Fowler. This exacting work occupied the greater part of his time for the next fifteen years. From 1859 to 1867 he was director of the Düsseldorf Academy. His better known paintings include "Shepherd and Shepherdess" (1845), "Cain and Abel" (1864), "Penelope" (1877), and "The Sacrifice of Iphigenia" (1882). He also made some illustrations for the *Nibelungenlied* which were much admired. He died in Düsseldorf December 27, 1889.

BEN′DER, or **BENDERY**, byĕn-dyĕr′ĭ (Ar., Turk., market, harbor). A district town in the Government of Bessarabia, Russia, situated on the right bank of the Dniester, 53 miles from its mouth, and 36 miles from Kishinev, the capital of the government (Map: Russia, C 5). It is poorly built. It contains a number of churches, synagogues, a mosque, and a gymnasium for women. The trade is in grain, timber, animals, and wine. The fort, situated near the town, was abandoned in 1897. Population, in 1885, 44,700; 1897, 31,800. A large portion of the population is Jewish, and the rest consists of Russians, Armenians, and Tartars. In 1770 the Russians captured the place, and put the garrison and inhabitants, then amounting to about 30,000, to the sword. After changing hands repeatedly between the Turks and the Russians, Bender was finally ceded to the latter by the Peace of Bucharest, 1812. Charles XII. of Sweden lived from 1709 to 1712 at Varnitza, a village near Bender.

BENDER, Wilhelm (1845-1901). A German theologian and philosopher. He was born at Münzenberg, in Hesse, January 15, 1845. He studied at Göttingen and Giessen, became professor of theology at Bonn, 1876, and was transferred to the philosophical faculty, 1888. An address he made at the Luther celebration of 1883 made a great sensation (*Reformation und Kirchentum*, Bonn, 1884), because of its extreme rationalistic tone, and he renewed the sensation by his later publications, *Das Wesen der Religion und die Grundgesetze der Kirchenbildung* (1886; 4th ed., 1888); and *Der Kampf um die Seligkeit* (1888), in which he explains religious phenomena by purely naturalistic evolutionary philosophy. In 1899 he published the first volume of *Mythologie und Metaphysik: Grundlinien einer Geschichte der Weltanschauungen* (Stuttgart).

BENDER ABBAS, bĕn′dēr äb′bás (Ar., Pers., harbor of Abbas). A seaport of Persia on the Strait of Ormuz, opposite the islet of Ormuz (Map: Persia, F 7). It is very poorly built, and its former commercial importance has diminished considerably. The chief exports are opium, fruit, tobacco, wool, and carpets. The annual imports amount to about $2,250,000, and the exports to about $900,000. The town is connected by lines of steamships with Abushehr, Muscat, Bombay, and Basra. Population estimated at 8000. The most flourishing period in the history of the town was during the Seventeenth Century, after the exclusion of the Portuguese by Shah Abbas in 1622. Owing to the disturbed state of the surrounding country, the trade was gradually transferred to Abushehr and the northern ports.

BEN'DIGO, formerly **SAND'HURST**. The capital of Bendigo County, Loddon District, Victoria, Australia, on Bendigo Creek, 60 miles north-northeast of Ballarat, and on the railway between Melbourne and Sydney (Map: Victoria, D 3). It is an important gold-mining, wine-making, agricultural, and railway centre. Its industrial establishments comprise railway workshops, foundries, breweries, coach-making, and brick and tile yards. The town is well built, has government buildings and offices, churches, mechanics' institute, a hospital, fine public park, botanical gardens, and owns a good water-supply. Founded in 1851, it became a municipality in 1855, a borough in 1863, and was created a city in 1871. Population, in 1891, 26,744; in 1901, 31,020, including 290 Chinese. Consult Mackay, *History of Bendigo* (Melbourne, 1891).

BENDIRE, běn-dē'rē, Charles Emil (1836-97). An American ornithologist. He was born in Darmstadt, Germany, April 27, 1836. He came to the United States in 1852, and two years later entered the army as a private. He retired April 24, 1886, with the rank of captain. In 1890 he was made brevet major for distinguished services rendered in 1877, while fighting the Indians at Cañon Creek, Mont. He died in Jacksonville, Fla., February 4, 1897. During his many campaigns, and while stationed at various remote army posts in the West, Southwest, and Northwest, he was most active in improving roads, surveying and constructing telegraphic lines so as to better military service, made independent explorations, and availed himself of the excellent opportunity to study birds. It is supposed that he began to collect the nests and eggs of birds about the year 1870. In all, he published about fifty papers and books, the majority of which relate to birds, especially with reference to nidification. His largest work, *Life-Histories of North American Birds, with Special Reference to Their Breeding Habits and Eggs* (Smithsonian Contributions, Washington, 1892 and 1896), was left incomplete at the time of his death. His large collection of birds' eggs, 15,000 in all, he presented to the United States National Museum.

BEN'DIS. A female divinity of Thrace, identified by the Greeks with Artemis, and later with Hecate. She was probably a moon goddess. In Plato's time a festival in her honor, called Bendideia, was celebrated with processions and torch-races at the Piræus.

BEND-THE-BOW. (1) A name for Locksley (or Robin Hood), in Scott's novel *Ivanhoe*. (2) The name of an archer in *Castle Dangerous*, by Scott.

BENDZIN, běnd'zēn (Polish). The capital city of a district in the Government of Piotrkow, Russian Poland, on the banks of the Black Przemsza, 264 miles from Warsaw, and near the Warsaw-Vienna Railway (Map: Russia, A 4). The industrial activity of the population of Bendzin is centred in the large Government zinc-works. There is also considerable manufacture of fireproof bricks. In the neighborhood are the rich Ravier coal-mines. The interesting ruins of an ancient castle (built in the Thirteenth Century) are a feature of the town. Population, in 1897, 21,200, more than one-half of which is Jewish. By the 'Pact of Bendzin,' concluded here in 1589, Sigismund IV. was recognized by Austria as King of Poland, and the Archduke Maximilian, brother of Rudoph II., renounced his claims to the throne.

BENE, běn'ē. See Sesamum.

BENECKE, bā'ne-ke, Ernst Wilhelm (1838-—). A German geologist. He was born in Würzburg, and studied at the universities of Halle, Würzburg, Berlin, and Heidelberg. He was extraordinary professor at Heidelberg University from 1869 to 1872, when he became full professor at Strassburg. His chief researches have been upon the invertebrate fossils of the Mesozoic rocks of Germany. He has been a member of the commission for the geological investigation of Alsace-Lorraine. Among his principal works are the following: *Ueber Trias und Jura in den Südalpen* (1866); *Abriss der Geologie von Elsass-Lothringen* (1879); *Geognostiche Beschreibung der Umgegend von Heidelberg* (1880).

BENECKE, Georg Friedrich (1762-1844). A German philologist. He was born at Mönchsroth, in the former principality of Ottingen, and studied at the University of Göttingen, where he became professor of philosophy in 1814, and chief librarian in 1829. He was the first academic lecturer on Old-German literature, and ranks with Grimm and Lachmann as an authority on Middle High German. His editions of mediæval poetry include: Boner's *Edelstein* (1816); Wirnt von Grafenberg's *Wigalois* (1819); and Hartmann von Aue's *Iwein* (1842).

BENEDEK, běn'e-děk, Ludwig von (1804-81). An Austrian general, son of a physician of Odenburg, Hungary. He received his military education at the Academy Wiener-Neustadt and entered the army as ensign in 1822. In 1846 he had reached the rank of colonel, and distinguished himself in suppressing the insurrection in Galicia. In 1847 he was sent to Italy, where he fought with bravery in the campaign of 1848, especially at Curtatone. The following year he took a conspicuous part in the capture of Mortara and in the battle of Novara (March 23), and in April was sent as major-general to Hungary, where he also served with gallantry. In the Italian campaign of 1859, Benedek commanded the Eighth Corps of the Austrians, and was the last to leave the field at Solferino; was military governor of Hungary in 1860, and soon afterwards was given the command of the Austrian army in Venetia. He led the Austrians in the war with Prussia in 1866 until he was disastrously defeated at Sadowa. See Seven Weeks' War.

BENEDEN, bā'ne-děn, Pierre Joseph van (1809-94). A Belgian zoölogist, born in Mechlin. He was appointed director of the Museum of Natural History in Louvain in 1831, professor at the University of Ghent in 1835, and professor of zoölogy and paleontology at the Catholic University of Louvain in 1836. In 1842 he was made a member of the Belgian Academy of Sciences, of which institution he was elected president in 1881. His principal works are: *Zoölogie médicale* (in collaboration with Gervais, 2 vols., 1859); *Ostéographie des cétacés vivants et fossiles* (in collaboration with Gervais, 1868-80); *La vie animale et ses mystères* (1863); *Les commensaux et les parasites dans le règne animal* (1875).

BENEDETTI, bā′ne-dĕt′tė, Vincent, Count (1817-1900). A French diplomatist of Greek origin, born in Corsica. He was French consul at Cairo and Palermo, secretary of legation in Constantinople; held office in the French Department of Foreign Affairs, and was secretary during the negotiation of the Treaty of Paris in 1856. In 1860 he went to Turin to negotiate the cession of Nice and Savoy to France, and in 1864 he was Ambassador to Berlin. Benedetti was personally concerned in the affair of the protest of Napoleon III. against the candidacy of the Prince of Hohenzollern for the throne of Spain, and forced himself upon King William in the public walk at Ems, July 13, 1870, in so offensive a manner that he was informed that the King had nothing further to communicate to him. It is a moot question how far he was really responsible for precipitating war with Prussia. Certainly Bismarck used Benedetti's blunder to the best advantage in carrying out his own plans and six days after the incident at Ems France declared war. Benedetti accused Bismarck of having in 1866 originated a Franco-Prussian treaty for the partition of Belgium and Luxemburg, but Bismarck showed that France herself had originated the scheme. Benedetti sought to justify his diplomatic activity in *Ma mission en Prusse* (Paris, 1871), and also published *Essais diplomatiques* (Paris, 1895).

BENEDETTO DA MAJANO, bā′nȧ-dĕt′tȯ dȧ mȧ-yä′nȯ (1442-97). A Florentine decorator and sculptor of the early Renaissance. He was a younger brother of Giuliano da Majano (q.v.), whom he at first assisted. He designed and executed some of the most perfect known pieces of church furniture; the pulpit at Santa Croce (Florence), the ciborium of San Domenico (Siena), the portal of the Sala de' Zigli in the Palazzo Vecchio (Florence), are, perhaps, the most beautiful in their class. He visited the Court of the King of Hungary, Matthias Corvinus—that famous patron of Italian art—and after 1490 entered the service of King Alfonso of Naples.

BENEDICITE, bĕn′ė-dĭs′ĭ-tė. A hymn or song of the 'Three Children' in the fiery furnace, which is given in the Old Testament Apocrypha, was sung in the Christian Church as early as the time of Saint Chrysostom, and is used in the Anglican morning-prayer when the Te Deum is not sung, from Septuagesima to Easter, and also during Advent, and in the office of lauds in the Roman Breviary. The name originated in the opening sentence, *Benedicite omnia opera Dei* (Praise ye all the works of God!).

BEN′EDICK. A cynical, witty lord of Padua, in Shakespeare's *Much Ado About Nothing.* He rails at marriage, but falls an easy prey to the plot to unite him and Beatrice. Hence the term, 'a Benedick,' for a newly married man.

BEN′EDICT. The name of 14 Popes. Benedict I., Pope 574-78, during the Lombard devastation of Italy, grief at which is said to have killed him.—Benedict II., Pope 683-85, canonized for his virtues. He decided the English controversy in favor of Wilfrid of York (q.v.), and labored in vain to reclaim Macarius, the Patriarch of Antioch, who was living in exile in Rome, from his monotheistic belief.—Benedict III., Pope 855-58. His election was opposed by the Emperor Lothair; but he was finally acknowledged, and did much during his short reign for the building and adornment of churches in Rome.—Benedict IV., Pope 900-03, famous for his charity to the poor and other virtues only too rare in the unhappy Tenth Century.—Benedict V., Pope 964-65, elected against the will of the Emperor Otho I., who carried him off to Germany, where he died a prisoner in Hamburg.—Benedict VI., Pope 972-74. He met with a similar fate, at the hands of the Consul Crescentius, son of the notorious Theodora.—Benedict VII., Pope 974-83. He was a promoter of monasticism and ecclesiastical discipline, and summoned a synod for the supression of simony. His later years, like those of Benedict I., were saddened by the devastation of Roman territory, this time by the Emperor Otho II.—Benedict VIII., son of Count Gregory of Tusculum, was elected in 1012; but the Antipope Gregory, who had been elected at the same time, fled to the court of the Emperor Henry II. to get his assistance, but Henry decided in favor of Benedict, who a little later crowned him in Rome (1014). Benedict afterwards defeated the Saracens, and took from them, with the help of the Pisans and Genoese, the island of Sardinia; and also various places in Apulia from the Greeks, by the help of Henry. He distinguished himself as a reformer of the clergy, and interdicted, at the synod of Pavia, both clerical marriage and concubinage. He died in 1024. See his *Life* by P. G. Wappler (Leipzig, 1897).—Benedict IX., a nephew of the preceding, named Theophylact, was elected Pope at the age of 10, in 1033; but a little later the Romans banished him. He was reinstated by Conrad II. (1038); again formally deposed by the Consul Ptolemæus, who set up Sylvester III. in his place (1044); and after three months was once more installed as Pope. By a new compact, John Gratianus was declared Pope under the name of Gregory VI. (1045). The Emperor Henry III. deposed all the three Popes—Benedict, Sylvester, and Gregory—and caused Suidger, Bishop of Bamberg, to be elected as Clement II. (1046); but on his death, in 1047, the deposed Benedict IX. again regained the Papal See, and held it eight months, until 1048, when he was displaced, first by Damasus II., and afterwards by Leo IX. According to one report he died in the Convent of Grotta Ferrata in 1056. See his *Life* by Giovagnoli (Milan, 1900).—Benedict X., a disputed Pope, 1058-59.—Benedict XI., Pope 1303-04.—Benedict XII., Pope 1334-42, one of the Avignon Popes.—Benedict XIII. (born Pietro Francesco degli Orsini), Pope 1724-30, was a learned and well-disposed man, of simple habits and pure morals, though rather strict in his notions on the Papal prerogative. He unfortunately yielded himself to the guidance of Cardinal Coscia, a greedy, unscrupulous personage, who greatly abused the confidence reposed in him. Benedict always exhibited great moderation in politics, and an honorable love of peace, and was instrumental in bringing about the Seville Treaty of 1729. During this pontificate, a remarkably large number of saints, chiefly from the monastic orders, including Pope Gregory VII. and John of Nepomuk, were added to the calendar. The name Benedict XIII. was also claimed by the Antipope Pedro de Luna (q.v.) from 1394 to 1409.—Benedict XIV. (Prospero Lambertini), Pope 1740-58—the most worthy to be remembered of all the pontiffs so named. He was born in Bologna in 1675. Before his elevation, he had distinguished himself by extensive learning, and by ability in the several offices of *promotor fidei* Bishop of Ancona (1727), cardinal (1728), and Archbishop of Bologna (1731). Succeeding Clement XII., he began his pontificate in 1740, with several wise and conciliatory measures; founded chairs of physic, chemistry, and mathematics in Rome; revised the Academy of Bologna, and instituted others; dug out the obelisk in the Campus Martius, constructed fountains, rebuilt churches; caused the best English and French books to be translated into Italian; and in many other ways encouraged literature and science. His piety was sincere, enlightened, and tolerant, and his doctrines were well exemplified in his practice. He was extremely anxious that the morals of the clergy should be untainted; and, to that effect, established a board of examiners for all candidates to vacant sees. In proof of his toleration, he showed the frankest kindness to all strangers visiting his capital, whatever the nature of their religious opinions. The only accusation brought against him by his Roman subjects was "that he wrote and studied too much, but ruled too little," or left affairs of business too much in the hands of Cardinal Valentine. After a painful illness, Benedict XIV. died May 3, 1758. His most important works are that *On the Diocesan Synod; On the Sacrifice of the Mass;* and *On the Beatification and Canonization of Saints*, a standard work, of which a part was translated under the title *Heroic Virtue* (London, 1850, 3 vols.). An edition of his writings was published under the care of the Jesuit Azevedo (12 vols., 1747-51), but more completely at Venice (1767, 15 vols.); and at Prato (1839-46, 17 vols.). His letters, written in Italian, to Carnu Peggi, between 1729 and 1758, were published by F. X. Kraus (Freiburg, 1884, 2d ed. as a biography by F. Scarselli, with a bibliography, 1888). Some more of his letters, edited by B. Manzone, appeared at Bra in 1890.

BENEDICT ACCOLTI, ȧk-kōl′tē. See Accolti Benedetto.

BENEDICT, David (1779-1874). An American Baptist historian. He was born at Norwalk, Conn., October 10, 1779. He graduated from Brown University, 1806, and was pastor at Pawtucket, R. I., from 1806 till 1831, and then carried on an active ministry at large till his death there, December 5, 1874. He is remembered for his researches in Baptist history embodied in his *General History of the Baptist Denomination in America and Other Parts of the World* (New York, 1848), and *Fifty Years Among the Baptists* (1860).

BENEDICT, Frank Lee (1834—). An American novelist. Of his numerous stories, the more noteworthy are *John Worthington's Name; Miss Van Kortland* (1870); *Her Friend Laurence* (1879); and *The Price She Paid* (1883). His verses are collected in *The Shadow Worshipper and Other Poems* (1857).

BENEDICT, Sir Julius (1804-85). A German-English musician and composer, born of Jewish parents in Stuttgart. He studied under Abeille, Hummel, and finally Weber, who procured for him (1824) the post of music director of the Kärntnerthortheater, Vienna. In 1825 he obtained a similar position in San Carlo, Naples. Here he produced an opera buffa, *Giacinta ed Ernesto*, and in Stuttgart (1831) a serious opera, *I Portoghesi a Goa*. Both were failures. He appeared, however, with great success as a pianist in Paris in 1835, and later in London, where he settled, directing opera buffa at the Lyceum, in 1836. He was conductor of English opera at Drury Lane (1838), where his works, *The Gypsy's Warning* (1838), *The Birds of Venice* (1843), and *The Crusaders* (1846), were produced. After conducting opera in Covent Garden and at festivals, he went to America (1850) with Jenny Lind, and returning in 1852, resumed his work as teacher of the piano, composer and conductor of the opera at Covent Garden, where his operatic masterpiece, *The Lily of Killarney*, created a furore in 1862. He wrote two symphonies and several cantatas (*Undine, Richard Cœur de Lion, Saint Cecilia*). His oratorio, *Saint Peter*, written for the Birmingham Musical Festival, 1870, met with extraordinary success. His operas have much dramatic and melodic beauty, and in style and feeling are singularly English for compositions by a foreigner. He was knighted in 1871 and received many foreign decorations. Weber's biography, in Hueffer's *Great Musicians*, was written by Benedict.

BENEDICT, Saint. The founder of monachism in the West. He was born of a rich and respected family at Nursia (now Norcia), 70 miles northeast of Rome, in A.D. 480. At an early age Benedict was sent to the schools of literature and jurisprudence in Rome, but soon grew dissatisfied with the sterile character of the instruction dispensed. The world was full of distractions, impurities, and ignorance; and it was difficult to resist, by the ordinary safeguards of virtue, the colossal evils by which men were environed. Only, therefore, in the devotions of religion, in the holy silence of solitary meditation, did Benedict see a safe refuge from the sins of the time, and the possibility of realizing a spiritual strength which would enable him to stem the tide of corruption that was setting in. He resolved to leave the city, and betake himself to some deep solitude in which the murmur of the world would be inaudible, and alone in the rocky wilderness wrestle with his own nature until he had conquered it and laid it a sacrifice on the altar of God. In pursuance of this resolution, when he had only reached, according to some, the age of 14, he departed from Rome, accompanied for the first 24 miles by the nurse whom his parents had sent with him as an attendant to the city. Benedict then left her and retired to a deserted country lying on a lake, hence called *Sublacum* (now Subiaco). Here, in a cavern (which afterwards received the name of the Holy Grotto), he dwelt for three years, until his fame spread over the country, and multitudes came to see him. He was now appointed abbot of a neighboring monastery, but soon left it, as the morals of the half-wild monks were not severe enough for his taste. This, however, only excited a livelier interest in his character, and as he lived in a period when the migration and interfusion of races and nations were being rapidly carried on, he could not fail to draw crowds of wanderers about him. Wealthy Romans also placed their sons under his care, anxious that they should be trained for a spiritual life. Benedict was thus enabled to found twelve cloisters, over each of which he placed a superior. The barbarous Goths even were attracted to him, and were employed in the useful and civilizing practice of agriculture, gardening, etc. He now sought another retreat, and, along with a few followers, founded about 529 a monastery on Monte Cassino, afterwards one of the richest and most famous in Italy. Here he extirpated the lingering relics of paganism, and had his celebrated interview with Totila, King of the Goths, to whom he spoke frankly and sharply on his errors. In 515 he is said to have composed his *Regula Monachorum*, in which he aimed, among other things, at repressing the irregular and licentious life of the wandering monks by introducing stricter discipline and order. It eventually became the common rule of all Western monachism. The monasteries which Benedict founded were simply religious colleges, intended to develop a high spiritual character, which might beneficially influence the world. To the abbot was given supreme power, and he was told to acquit himself in all his relations with the wisdom of God, and of his Master. The discipline recommended by Saint Benedict is, nevertheless, milder than that of Oriental monachism with regard to food, clothing, etc.; but enjoins continual residence in the monastery, and, in addition to the usual religious exercises, directs that the monks shall employ themselves in manual labors, imparting instruction to youth, copying manuscripts for the library, etc. By this last injunction, Saint Benedict, though this was not directly intended, preserved many of the literary remains of antiquity; for the injunction, which he gave only with regard to religious books, was extended afterwards to many secular productions. It is remarkable that the founder of the most learned of all the monastic orders was himself so little of a scholar, that Saint Gregory the Great described him as being *scienter nesciens, et sapienter indoctus*—learnedly ignorant, and wisely unlearned. Saint Benedict died March 21, 543.

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BENEDICT OF ANIANE, or WITIZA (750-821). A French monk, born in Languedoc. He entered the Benedictine Order in 774, and five years later founded a monastery on the banks of the river Anianus. He devoted himself chiefly to the task of restoring the original principles of the Order, and Louis *le Débonnaire* appointed him supervisor of all Frankish monasteries and decreed that the adoption of the rules advocated by Benedict should be binding upon the Benedictine Order throughout France. He was canonized upon his death in 821, the 12th of February being dedicated by the Roman Catholic Church to his memory.

BENEDICT BIS'COP (c.629-690). An English ecclesiastic of the Seventh Century, who exercised a most important and beneficent influence on Anglo-Saxon civilization and learning. He was born about the year 629, of a noble Northumbrian family (his patronymic, according to Eddius, being Baducing), and until about his 25th year was a courtier of Oswiu, King of Northumbria. About that time he gave up his court life and accompanied Wilfrith to France, whence he went on to Rome (654), where he spent about ten years in study, and whence he seems to have returned soon after the Synod of Whitby in 664. In 665 he was in Rome a second time, being sent on a mission by Alchfrith, King of Northumbria. After a stay in Rome of a few months, he proceeded to Lérins, in Provence, where he became a monk, received the tonsure, and spent about two years, thus acquiring a knowledge of monastic discipline. He returned to Rome in 667, came to England with Theodore and Adrian, and was made abbot of the Monastery of Saint Peter (afterwards that of Saint Augustine) in Canterbury. This charge he resigned two years later and went to Rome for a third time, for the purpose of bringing home the literary treasures which he had already collected. He returned about 672, bringing with him a large collection of valuable books, and repaired to Northumbria, where King Egfrith gave him land near the mouth of the Wear, on which he founded the famous Monastery of Wearmouth. Workmen were brought from France to build and glaze the church and monastery, this being one of the earliest instances of the use of glass for windows in England. He also introduced from Gaul and Rome (which he visited again in 687) church utensils and vestments, relics, pictures, images, and again a vast number of books. He also brought with him John, arch-chanter of Saint Peter's, who introduced the Roman choral service. On his return from this visit to Rome, King Egfrith presented him with more land on the other side of the Wear, at a place called Jarrow, on which he built a second monastery, dependent on Wearmouth. Benedict made his fifth and last journey to Rome in 687, and, as on former occasions, came home laden with books and pictures, bringing with him also, according to Bede, two silk palls "of incomparable workmanship." Shortly after his return from Rome he was seized with palsy, under which he languished three years, dying on the 12th of January, 690. During his long illness, he often anxiously exhorted his monks to look carefully after his books, and to preserve them from loss or injury.

The benefits conferred by Benedict on Anglo-Saxon civilization, which was then only in its dawn, and the impulse given by his labors to Anglo-Saxon learning, were greater than can now be estimated. It is not certain that he wrote any books, and those ascribed to him are of little value; but by his personal teaching, and especially by his founding at Wearmouth such a valuable and, for the time, extensive library, he implanted in the nation a taste for literature and learning, which soon was fruitful in results, and continued to be so for many centuries. Bede, a pupil, wrote his life.

BENEDICTINE, bĕn′ê-dĭk′tĭn. A liqueur somewhat resembling chartreuse, distilled at Fécamp (q.v.) in France. It gets its name from the fact that it was originally manufactured by the Benedictine monks. Since the French Revolution, however, the preparation has been in the hands of a secular company. See LIQUEUR.

BENEDICTINE EDITIONS OF THE FATHERS. Scarce and costly volumes containing the works of Barnabas, Lanfranc, Bernard, Anselm, Augustine, Cassiodorus, Ambrose, Hilary, Jerome, Athanasius, Gregory of Tours, Gregory the Great, Hildebert, Irenæus, Lucius Cæcilius, Chrysostom, Cyril of Jerusalem, Basil, Cyprian, Justin Martyr, Origen, and Gregory Nazianzen—in all 61 volumes. So called because edited by scholars of the Benedictine Order of monks in the Seventeenth and Eighteenth centuries.

BENEDICTINES. The general name of the monks following the rule of Saint Benedict. The first Benedictine monastery was founded at Monte Cassino, in the Apennines about midway between Rome and Naples, by Saint Benedict himself, about 529. It was partly modeled on what he had learned of the earlier Eastern monasticism, but differed from that in giving greater prominence to the community idea, while the monks of the East had tended more to live a solitary life. In Benedict's idea, the monastery was to be to the monk what the family was to persons living in the world—an ordered home, with reciprocal duties and claims. Each monastery formed a separate community, with its own internal organization; the founder did not legislate for a world-wide organization, like the mendicant orders or the Jesuits. In fact, strictly speaking, he did not found an order, but laid down a rule by which to govern a state of life. Each of the modern orders, moreover, has in view some special work to which its activities are directed; the Benedictine has no external work peculiar to his order. The earlier monasticism differed from the later in having no relation to the clerical state; most of the monks and even some abbots were laymen at the first. The vows taken by those who joined a Benedictine monastery were originally three—of stability, i.e. to remain attached to the monastery, not to wander at will; of conversion of life, i.e. to labor until death to attain the perfection of the state to which they were called; and of obedience to their superiors.

The Order increased so rapidly that after the Sixth Century the Benedictines must be regarded as the main agents in the spread of Christianity, civilization, and learning in the West. The provision of the rule for incessant industry resulted, among other things, in the promotion of systematic agriculture and the reclaiming of large tracts of land which would otherwise have lain waste. Without them, the continuity of Christian art, like that of Christian literature, would doubtless have been broken in the West. In the Dark Ages between the Seventh and Eleventh centuries, when confusion and barbarism prevailed in the political and social spheres, the artistic tradition which had been carried on by the bishops was taken up by the great monasteries of this Order; and they also afforded the only common meeting-ground for sharply distinct social classes, thus exerting a unifying influence upon the new nationalities then springing into life.

Each of these establishments was a world in itself. It included not only fully professed monks, but lay brothers, or *conversi*, who had greater freedom of movement and occupation. The high wall of the monastery inclosed a great variety of structures centring around the church, to which were attached, generally on the right side, the principal group of monastic buildings—the dormitories above (one for choir brothers and one for *conversi*) and the refectory, chapter-house, and general hall, library, kitchen, store-rooms, etc., all grouped about a main cloister. Then there were other groups; one in particular with a hospital, a chapel and cloister for convalescents, doctor's quarters, and the like; another group for the schools and for teaching of arts and trades; sometimes another devoted to the external laity with a hospice, refectory, chapel, stable, and barns. A drawing of about the year 820 shows the plan of the projected buildings at Saint Gall (q.v.), altogether the most elaborate known, where everything is labeled with a detailed description, even to the garden devoted to growing herbs and simples for the doctor's pharmacopœia, and the workshops assigned to the different arts and trades. The weaving and dyeing of cloth, the curing and tanning of skins, were followed by the work of the tailor, the shoemaker, and the embroiderer. The preparation of vellum led up to writing, illuminating, and binding of manuscripts. Glass-blowing was practiced from its commonest to its most artistic developments. Carpentry and joinery, masonry in brick and stone, were taught practically in construction. Then came the more purely artistic occupations of bronze casting and hammering, work in gold, silver, and silver-gilt, ivory, wood and gem carving, enameling and inlaying, layer - sculpture, fresco - painting, and sometimes mosaic-work. No known branch of art or industry was neglected. One monk was usually at the head of this entire department, with others in charge of the subdivisions; but often lay brothers were at the head—all were admitted equally in these branches.

There were even established, outside of the monastic walls, groups of secular workmen employed by the monastery, often its slaves, serfs, or dependents, whose labor was at the abbot's disposal. Thus there grew up villages and even towns of considerable size around the larger monasteries. Such communities were among the earliest organized in the Middle Ages, each a formative nucleus amid a general disintegration. When a sovereign or noble wished to build or decorate a church or any other building, or to procure a beautiful illuminated manuscript, ivory carving, enameled book-cover, hanging or tapestry, reliquary or chalice, it was to such monasteries that he addressed himself. Artists were sent out from them to do whatever had to be done on the spot, or the work was executed in the monastery. Different communities were famous for excellence in particular branches, and often interchanged skillful monks for a time. When Abbot Desiderius established his famous art school at Monte Cassino, in the middle of the Eleventh Century, he imported instructors from Constantinople as well as from all parts of southern Italy, and so revived certain branches which had fallen into decay in the West. Most of the art products of the Carlovingian Age issued from these monastic schools.

It cannot be said that the Benedictines accomplished any great progress in architecture. They adhered to the old basilican style (see BASILICA), often replacing the antique columns, which had become scarce, by plain square piers or built-up shafts. They showed a certain poverty of architectural detail and of sculptured ornament, except at the very close, in the Eleventh and Twelfth centuries. On the other hand, they always maintained a mastery of fresco-painting. The grand series at Saint Angelo in Formis is the best example of the school of Monte Cassino, under Byzantine influence (Eleventh Century); that of San Pietro a Grado, near Pisa, shows the unadulterated Italian Benedictine. The German style appears at Reichenau and Ingelheim; the French at Saint-Savin near Poitiers. In laying out the buildings of the monasteries, there was not much uniformity, as the Benedictine rule left each community an autonomous unit.

While, as has been said, the Order had the very greatest influence on the preservation of learning throughout the West, its chief literary glories are associated with the Congregation of Saint-Maur in France, founded by letters patent of Louis XIII., in 1618, which had later its chief seat at Saint-Germain-des-Près, near Paris. When the Order of the Benedictines was suppressed, with the other religious Orders, by the Revolution in 1792, its splendid conventual buildings were destroyed. Numbering among its monks such scholars as Mabillon, Montfaucon, Sainte-Martha, D'Achéry, Martène, Durand, Rivet, Clémencet, Carpentier, Toustain, Constant, and Tassin, it rendered services to literature which would be difficult to overestimate. Besides admirable editions of many of the Fathers (see BENEDICTINE EDITIONS OF THE FATHERS), the world of letters owes to these men the *Art de vérifier les dates* (3 vols., fol., 1783-87); a much enlarged edition of Ducange's *Glossarium Mediæ et Infirmæ Latinitatis* (6 vols., fol., 1733-36); a supplement (1766, 4 vols., fol.); the *De Re Diplomatica* (1681 and 1709, fol.); the *Nouveau traité de diplomatique* (6 vols., 4to, 1750-65); *L'antiquité expliquée* (15 vols., fol., 1719-24); the *Monuments de la monarchie française* (5 vols., fol., 1729-33); the *Acta Sanctorum Ordinis S. Benedicti* (9 vols., fol., 1688-1702); a new and much improved edition of the *Gallia Christiana* (14 vols., fol., 1715-56); the *Annales Ordinis S. Benedicti* (6 vols., fol., 1713-39); the *Veterum Scriptorum Spicilegium* (13 vols., 4to, 1653-77); the *De Antiquis Monachorum Ritibus* (2 vols., 4to, 1690); the *De Antiquis Ecclesiæ Ritibus* (3 vols., 4to, 1700-02); the *Veterum Scriptorum et Monumentorum Amplissima Collectio* (9 vols., fol., 1724-33); and the *Histoire littéraire de la France* (9 vols., 4to, 1733-49). Since the Revolution, the revived French Benedictines, until troubled by recent Government interference, had resumed some of the unfinished labors of the Congregation of Saint-Maur; that of Solesmes, established in 1837, under the direction of Dom Guéranger, Cardinal Pitra, and others, has entered on literary enterprises of its own, such as the *Spicilegium Solesmense* (10 vols., 4to), and has also been famous for its revival of the ancient ecclesiastical music in all its purity.

In view of all that has been said above, Sir Walter Scott may be seen to have been amply justified in writing, at a time when the English-speaking world had completely forgotten its obligations to the monks, of their "works of permanent advantage to the world at large; showing that the revenues of the Benedictines were not always spent in self-indulgence, and that the members of the Order did not uniformly slumber in sloth and indolence." By degrees, however, corruption of manners began to accompany increasing wealth, until it became the practice in many places to receive almost exclusively the sons of noble and wealthy persons as novices among the 'black monks.' Several of the Popes attempted to regulate these disorders; and reforms of great consequence sprang from within the bosom of the Order itself. The first serious inroad into the influence of the regular Benedictines was made by the reform of Cluny (q.v.), under Abbot Odo, in 927; but as it did not break away from the Order, it really gave it new life and splendor. The mother house of Cluny was an immense establishment with a church, destroyed at the Revolution, larger than any Gothic cathedral, a superb specimen of Romanesque. The patronage of the arts by this house and the eight hundred or more monasteries affiliated with it was offensive to Saint Bernard, who objected to the lavish expenditure for great church towers, elaborately sculptured façades and capitals, rich hangings and vestments, and treasuries filled with sacred vessels of gold and silver. From him came the spread of the reform of Citeaux (see CISTERCIANS), in 1098. The new spirit was less literary, less exclusive; the arts and industries were not so thoroughly cultivated within the precincts. Greater opportunity was offered to lay artists; the *conversi*, or lay brothers, were encouraged to break loose and form associations of artists who competed with the monastic artists. This culminated during the Twelfth Century, which witnessed not only the transition to the Gothic style of art, but the transference of artistic supremacy from monastic to secular hands. Another famous reform on stricter lines was that of the Trappists (q.v.), in 1664, an offshoot from the Cistercians.

At one time the Order is said to have had no less than 37,000 monasteries; in the Fifteenth Century 15,107 are enumerated, of which the Reformation abolished a great many. In England, at the Dissolution under Henry VIII., there were (as given by Tanner, *Notitia Monastica*, 1695) 113 abbeys and priories for monks, and 73 houses of Benedictine nuns. They now have less than a score in that country. In the United States the Order was introduced in 1846, by a colony from the famous Abbey of Metten, in Bavaria, Saint Vincent's Priory, Latrobe, Westmoreland County, Pa., made an abbey in 1855, being the first foundation. In the older days the most important monasteries for wealth, possessions, and patronage of art and literature were in Italy, Monte Cassino, Cava de' Tirreni, Farfa, Bobbio, Nonantula, and Subiaco; in Germany, Fulda, Corvei, Saint Gall, Hirsau, and Reichenau; in France, Saint-Denis, Saint-Martin of Tours, Corbie, Fontanelle, Saint-Bénigne of Dijon; in England, Jarrow and Wearmouth. Before the Reformation many of the mitred abbots in the last-named country sat in the House of Lords with the bishops. The abbot of Saint Augustine's, Canterbury, was the first to obtain these rights of *pontificalia* from Pope Alexander II., in 1063. See ABBOT.

For the history of the Order, consult the *Annales Ordinis S. Benedicti* and *Acta Sanctorum Ordinis S. Benedicti* already referred to; Reyner, *Apostolatus Benedictinorum in Anglia* (Douai, 1626); the *Bullarium Cassinense* (2 vols., fol., Venice, 1650); Tassin, *Histoire de la Congrégation de Saint-Maur* (Paris, 1770); *Crónica del orden de San Benito* (7 vols., fol., Salamanca, 1609-15); Montalembert, *Monks of the West* (Eng. trans. by Gasquet, London, 1895, 6 vols.); Taunton, *The English Black Monks of the Order of Saint Benedict* (London, 1897); Dantier, *Etudes sur les Bénédictins* (Paris, 1864); *Les monastères bénédictins de l'Italie* (Paris, 1866). For the artistic side, see more particularly Schlosser, *Die abendländische Klosteranlage des früheren Mittelalters* (Vienna, 1889); Lenoir, *L'architecture monastique* (Paris, 1852); Springer, *Klosterleben und Klosterkunst* (Bonn, 1886). The methods of the monastic schools for all branches of art except architecture are best recorded in the interesting technical manual of the Eleventh Century called *Diversarum Artium Schedula*, by a monk named Theophilus. Many contemporary annals of the monasteries are published in the *Monumenta Germaniæ Historica* of Pertz, and in Muratori's *Scriptores Rerum Italicarum*. For a vivid picture of life in an English monastery, see Carlyle, *Past and Present*.

BENEDIC′TION (Lat. *benedictio*, a praising, blessing, from *bene*, well + *dicere*, to speak). A solemn invocation of the divine blessing upon men or things. The ceremony in its simplest form may be considered almost coeval with the earliest expressions of religious feeling. We know from Holy Writ that the Jewish patriarchs before they died invoked the blessing of God upon their children, and at a later period the priests were commanded to implore the Divine blessing upon the people. Christ sanctioned the custom, which was consequently carried forward into the primitive Church, where it gradually developed itself in different forms. In the Eastern as well as the Western Church it is considered an essential preliminary to almost all important acts. One of the most superb spectacles that a stranger in Rome can witness occurs on Easter Sunday, when the Pope, attended by his cardinals, pronounces after mass a solemn benediction *urbi et orbi* (on the city and the world). The benediction, however, is not confined to a form of prayer, but is accompanied with sprinkling of holy water, the use of incense, the sign of the Cross, etc. The chief cases in which a benediction is bestowed are: The coronation of kings and queens, the confirmation of all Church dignitaries, and the consecration of church vessels, bells, and sacred robes; the nuptial ceremony, the absolution, and the last sacrament. The most solemn form of benediction in the Roman Church is that 'with the most holy sacrament,' which is administered by the bishop or priest with the monstrance or ostensory containing the consecrated elements. Besides these, lands, houses, cattle, etc., often receive a benediction from the priest. In the English Church service there are two benedictions; in the Scotch, only one. In the Greek Church, when the benediction is being pronounced, the priest disposes his fingers in such a manner as to convey symbolically to the faithful who are close enough to observe the arrangement the doctrine of the Trinity and the twofold nature of Christ.

BEN′EDICTS′SON, VICTORIA MARIA. See AHLGREN, ERNST.

BEN′EDIC′TUS (Lat., blessed, praised). A portion of the service of the mass of the Roman Church; also the so-called 'canticle of Zachary' (Luke i. 68-79) used in the Roman breviary at lauds, and thence adopted into the Anglican morning service.

BENEDIX, bā′ne-dĭks, RODERICH (1811-73). A German playwright. He was born in Leipzig, and had a wandering career—by turns actor, opera singer, dramatic author, theatrical manager, and editor of a literary journal. His dramatic works fill 27 small volumes (Leipzig, 1846-74). Of his one-act comedies and monologues, 46 are collected in his *Haustheater* (2 vols.). The best of the longer plays are: *Das bemooste Haupt* (1841); *Der Liebesbrief;* and *Dr. Wespe*. Of the shorter comedies, *Der Prozess*, *Der Weiberfeind*, *Günstige Vorzeichen*, and *Die Sonntagsjäger* are favorites in Germany and America. Benedix's plays are healthy in tone, simple in structure, lively in wit, and robust in humor, usually farcical and frequently burlesque, showing always an intimate knowledge of stage technic that contributed greatly to their lasting success.

BEN′EFICE (Med. Lat. *beneficium*, a fief, Lat. *beneficium*, favor, from *bene*, well + *facere*, to do). In the feudal system of land tenure (see FEUDALISM) a grant of land by the lord to a vassal to be held by the latter on certain terms of service; in its later history the term was identical in meaning with fief (q.v.), or feud (q.v.). In this sense it has become obsolete, however, and it is now in England used almost exclusively to denote an ecclesiastical preferment or living. It has no reference to the dignity or office of the incumbent, but describes the beneficial property right enjoyed by him by virtue of his office. The right to appoint a curate or vicar to a benefice is in itself a species of property, and is enumerated by Blackstone among incorporeal hereditaments. See ADVOWSON and PATRONAGE; also consult Phillimore, *Ecclesiastical Law of the Church of England* (2d ed., London, 1895).

BEN′EFI′CIARY (Lat. *beneficiarius*, pertaining to a favor. See BENEFICE). A legal term applied to the holder of a benefice or fief (q.v.). The word is employed to a large extent in American and later English law as a substitute for *cestui que trust*, a technical term of the common law derived from the Norman French, to denote a person in the enjoyment of an interest or estate held in trust by others. Beneficiary is thus strictly and technically used in the law of Scotland. As a term in the law of insurance, the beneficiary is the party entitled to the benefit or proceeds of the policy. Patent rights and copyrights are sometimes denominated beneficiary privileges. See TRUST.

BEN'EFIT OF CLER'GY (ME. *bienfet*, OF. *bienfet*, from Lat. *bene*, well + *factum*, something done, a deed, act), or PRIVILEGIUM CLERICALE. The privilege, claimed by the Mediæval Church for its clergy, of exemption from the process of the secular courts when charged with crime. The privilege was generally accorded by the Christian nations of Europe, and it operated to render the clergy amenable, especially in cases involving barbarous punishments, only to the authority of the Church. The ancient usage was, says Blackstone, "for the bishop or ordinary, to demand his clerks to be tried in the bishop's instead of the King's court." This exemption, enjoyed by all persons in holy orders, from the lay courts, was a privilege highly valued and stoutly defended by the clergy. This sentiment was powerfully supported by the growing sense of the sanctity attaching to the priestly office, and the result was the creation of a priestly caste owing allegiance primarily to the Church and subject only to her penalties.

In England the privilege was conceded in all cases of felony, except that of treason against the King; but not in cases of misdemeanor nor in civil litigations. Originally available only in the case of persons in holy orders, it was extended in 1330, by a statute of Edward III., to all clerks, whether religious or secular, the last class comprehending all persons who could read. The gradual amelioration of the penal laws and the spread of education rendered the benefit of clergy more and more of an anachronism, and it was, by successive acts of Parliament, gradually shorn of its privileges, and finally, in 1827, abolished. It survives only in the statute forbidding the judicial impeachment of archbishops or bishops for crime without the consent of the King, and in the exemption of the clergy from arrest while in the performance of the services of the Church.

The process whereby the benefit was claimed varied with the growing power of the ordinary tribunals. Originally the bishop was entitled to demand the person of the clerk immediately upon his apprehension, whereupon the jurisdiction of the secular authority ceased. Later the courts asserted the right to compel the presence of the accused, in order to inquire into the question of his guilt or innocence, as well as his right to the privilege; and finally the courts took full jurisdiction and proceeded against him as in the case of an ordinary criminal, until a verdict was rendered, when he was allowed to plead his benefit in arrest of judgment. (See ARREST OF JUDGMENT.) The test of the prisoner's ability to read was thereupon made in open court, and if his claim was sustained, he was turned over to the bishop, or ordinary, to make his purgation. (See COMPURGATION.) The punishment of branding on the thumb, which the secular court was authorized to inflict before discharging the convicted clerk from its custody, was mitigated and finally abolished by statute of 19 Geo. III. (1779).

In the United States the right was recognized in a few early cases in the colonies of North Carolina, South Carolina, and Virginia. It was expressly forbidden by an act of Congress passed April 30, 1790, in all cases of conviction of capital crime. The early history of the practice in England is fully given in Pollock and Maitland. *History of English Law* (2d ed., Boston, 1899). For its later history, consult: Hale, *History of the Pleas of the Crown;* Blackstone, *Commentaries on the Law of England;* and Stephen, *History of the Criminal Law of England* (London, 1883).

BEN'EFIT OF IN'VENTO'RY. A term of the civil law denoting the privilege which the heir obtains of being released from liability for the debts and charges of his ancestor beyond the value of the property of his succession, by causing an inventory of these effects within the time and in the manner prescribed by law. It is still employed in the practice of Louisiana. It was formerly of importance also in Scotch law; but by the abolition of the *annus deliberandi* and other liberal provisions of the statutes 10 and 11 Vict., c. 47, secs. 23 and 25, its value has been minimized. See HEIR; INHERITANCE; and INVENTORY.

BEN'EFIT SOCI'ETIES. Associations formed by groups of persons to provide for a cheap form of insurance, which secures to their members, through regular dues or special assessments, a provision for old age, funeral expenses, death payments to widow and orphans, or sick allowances. Societies exist with this beneficial feature as their primary object; but more often it is added to the work of special associations in order to make membership more attractive. The associations formed by men in the same business or profession, trade organizations, philanthropic societies, and churches frequently provide for such a fund. Certain trades-unions tend to emphasize the benefit feature, sometimes paying out-of-work allowances. Women are permitted to belong to some societies. Since the success of all such societies depends upon intelligent financial management, the funds have been occasionally dissipated by ignorance, incompetence, or fraud. In England, societies with beneficial features are called 'friendly societies,' and 'benefit societies' are associations entered into for the purpose of raising by periodical subscriptions a fund to assist members in buying land and erecting buildings upon it. The latter societies have been very successful, and they have raised large sums which have been invested in bonds and mortgages. See BUILDING AND LOAN ASSOCIATIONS; SECRET ASSOCIATIONS; FRIENDLY SOCIETY; INSTITUTIONAL CHURCH; PENSIONS; RAILWAY BROTHERHOODS; TRADE-UNIONS.

BENEKE, bā'ne-ke, FRIEDRICH EDUARD (1798-c.1856). A noted German psychologist. He was born in Berlin, February 17, 1798. He studied theology at Halle, and afterwards philosophy at Berlin. In 1820 he began lecturing at the latter university, but two years later his lectures were interdicted by the Minister Altenstein, apparently because Beneke's philosophical views were in opposition to those of Hegel. Beneke then held a position as lecturer at Göttingen for three years, until in 1827 he was allowed to resume lecturing in Berlin. Upon the death of Hegel in 1832 he was appointed assistant professor of philosophy. On March 1, 1854, he disappeared from his home, and all traces of him were lost, until his corpse was discovered in the canal at Charlottenburg in June, 1856. He probably died by suicide.

Beneke was a prolific writer. His most important works were his psychological treatises. His standpoint throughout was empirical, opposed to Hegelian speculation, and closely allied to British Associationism. He believed that a true psychology, which is the basis of all knowledge, must be formulated in accordance with the rigid methods of physical science, and that the genetic method is most valuable. Despite this empirical vein, he found the elements of mind in certain formal capacities, termed the 'primal faculties.' His work is so often theoretical and inexact that it must be regarded as stimulating rather than fundamental.

His principal works are: *Erfahrungsseelenlehre, als Grundlage alles Wissens, in ihren Hauptzügen dargelegt* (1820); *Neue Grundlegungen zur Metaphysik* (1822); *Psychologische Skizzen* (1825-27); *Lehrbuch der Psychologie als Naturwissenschaft* (4th ed., 1877); *Erziehungs- und Unterrichtslehre* (1835-36; 4th ed., 1876); *System der Logik als Kunstlehre des Denkens* (1842); *Pragmatische Psychologie, oder Seelenlehre in der Anwendung auf das Leben* (1850).

BENENGELI, bā′nĕn-hā′lė, Cid Hamet. The name of the old chronicler whose work Cervantes pretends to have used in his *Don Quixote*.

BEN′ET, Stephen Vincent (1827-95). An American soldier, born in Saint Augustine, Fla. He graduated at the University of Georgia, and in 1849 at West Point, where he was assistant professor of geography, history, and ethics from 1861 to 1864. He was appointed assistant to the chief of ordnance in 1869, and from 1874 until his retirement in 1891 was chief of the department with the rank of brigadier-general. He translated Jomini's *Political and Military History of the Campaign of Waterloo;* and in 1862 published *Military Law and the Practice of Courts-Martial,* which is used as a textbook at West Point.

BEN′EVEN′TO (for derivation, see below). An archiepiscopal city in south Italy, capital of the Province of Benevento (Map: Italy, J 6). It is situated on a hill between the Calore and the Sabato, on the winding Naples-Foggia Railway, 60 miles northeast of Naples. The walls are constructed almost entirely from Roman ruins, and on the north side of the town is Trajan's triumphal arch, the Porta Aurea, one of the best-preserved Roman structures in south Italy, erected in A.D. 114 in expectation of the Emperor's return from the East, where he died in 117. It is 50 feet high, built of Greek marble, and bears appropriate reliefs. The Twelfth Century Lombard-Saracenic cathedral contains beautiful paintings, and has a bronze door adorned with reliefs of New Testament subjects, and said to have been made in Constantinople in 1150. There are Egyptian obelisks in many of the public squares. The principal manufactures are of gold and silver-plated ware, leather and parchment, and the trade in grain is important.

According to tradition, the Samnite *Maleventum* (Lat., ill-wind), the name of which was changed to *Beneventum* (fair wind) after the Roman victory over Pyrrhus in B.C. 275, was founded by Diomedes. In the cathedral is a relief showing the Calydonian boar adorned for sacrifice. During the Punic wars Beneventum remained faithful to the Romans and was plundered by Hannibal after his victory at Cannæ B.C. 216. It was destroyed by Totila in A.D. 545, and was rebuilt by Narses. In the Sixth Century the Lombards made it the capital of an independent duchy, of which Pope Leo IX., in 1049, had the possession guaranteed to him by Emperor Henry III. From 1806 to 1815 Benevento was the capital of a principality granted to Talleyrand by Napoleon; in 1815 it was restored to the Pope, and in 1860 became part of the kingdom of Italy. Five councils were held here in the Eleventh and Twelfth centuries. Population (commune), in 1881, 22,000; in 1901, 24,647. Consult Borgia, *Memorie istoriche della pontifigia città di Benevento* (Roma, 1763-69).

BENEV′OLENCE (Lat. *benevolentia*, good will, from *bene*, well + *velle*, to wish). In English legal history, a compulsory contribution levied by certain kings, without other authority than the pretense of prerogative. The designation dates from 1473, when Edward IV. asked it "as a mark of good-will toward his rule," but the tax had been known in former reigns. Subsequent kings tried the expedient with ill success, and Charles I. expressly declined to resort to it. The people protested against it in the Petition of Rights, etc., and various statutes have made it illegal without grant of Parliament. Consult Hallam's *Constitutional History of England,* and Stephen's *Commentaries,* Vol. I. (4 vols., New York, 1843-46).

BEN′EZET′, Anthony (1713-84). An American philanthropist. He was born in France, but emigrated to America, and in 1731 settled in Philadelphia. He wrote a number of tracts in the interest of the negro and the Indian, and was one of the earliest opponents of the slave-trade. Among his tracts may be mentioned: *A Caution to Great Britain and Her Colonies, in a Short Representation of the Calamitous State of the Enslaved Negroes in the British Dominion* (1767); *Some Historical Account of Guinea, with an Inquiry into the Rise and Progress of the Slave-Trade* (1774); *A Short Account of the Society of Friends* (1780); and *Observations on the Indian Natives of this Continent* (1784). Consult Roberts Vaux, *Memoir of the Life of Anthony Benezet* (Philadelphia, 1847).

BENFEY, bĕn′fī, Theodor (1809-81). A German Orientalist, born at Nörten, Hanover. He studied at Göttingen and Munich; from 1834 was a lecturer at the former university, and from 1848 professor. His researches in the Sanskrit language and literature were particularly extensive and valuable. In the introduction to his translation into German (2 vols., 1859) of the collection of fables known as *Pancatantra* (q.v.), he began a most interesting study of the influence of ancient Indian material upon the folk-lore of Asia and Europe. This investigation he continued in his periodical, *Orient und Occident* (published at Göttingen in 1863-65, 3 vols.), and in his introduction to G. W. H. Bickell's edition and translation into German (Leipzig, 1876) of the Syrian *Kalilag and Damnag*. He thus opened to other scholars a most profitable field. In English he published *A Practical Grammar of the Sanskrit Language* (1863, 2d ed., revised and corrected, 1868), and a *Sanskrit-English Dictionary* (1866). His writings further include an etymological dictionary of the Indo-Germanic languages (in 2 vols.), a valuable edition, with a glossary and a translation into German (1848), of the *Samaveda*, and a *Vollständige Grammatik der Sanskritsprache* (1852), supplemented by a *Chrestomathie* (2 parts, with a glossary, 1853-54). His *Kleinere Schriften*, edited by Adalbert Bezzenberger, appeared in Berlin in 1890-91 (2 vols.).

BENGAL, bĕn-ga̤l′ (Hind. *Bangâlā*, Skt. *Vangalam*, from *Vaṅga*, one of the five Aryan kingdoms). A lieutenant-governorship of British India, situated in the northeastern part of the Empire, extending from about latitude 19° 18′ to 28° 15′ N. and from about longitude 82° to 93° E. It is bounded by Nepal, Bhutan, and Assam (till 1874 a part of Bengal) on the north, Assam and Burma on the east, the Bay of Bengal and Madras on the south, and the Northwest and Central Provinces and Central India on the west. Thus outlined, the lieutenant-governorship comprises the provinces of Bengal proper, Behar, Orissa, and Chota-Nagpur, besides the tributary States. The total area of the four provinces under the direct administration of Great Britain is 151,543 square miles, while that of the tributary States amounts to 58,500 square miles.

In its topographical conformation Bengal may be regarded as consisting of two river valleys, the western part forming the basin of the Ganges, and the eastern that of the Brahmaputra. While in the northern part the surface partakes to some extent of the mountainous character of the neighboring regions, the central, and especially the southeastern part around the vast delta of the Ganges and Brahmaputra, is a low plain, whose character is determined solely by the two great water-arteries of the region, and the soil is mostly of an alluvial nature. With the exception of Egypt, there is hardly another country in the world in which the hydrographic system is such a determining factor in the agricultural and general economic conditions of the country as it is in Bengal. This is especially true of the Ganges. After a long and swift course through the mountainous regions of Northern India, where it receives the drainage of the surrounding country through its numerous tributaries, its course is checked by the more level surface of Bengal, and the immense quantities of silt brought by the current are deposited through numerous canals upon the surrounding level country. This process of natural manuring and periodic rejuvenation of the soil results in extraordinary fertility and productiveness, few regions excelling Bengal in variety or luxuriance of vegetation. In the southeastern part, where the country for hundreds of miles around is overflowed by the waters of the vast number of streams, streamlets, and creeks forming the complicated delta of the Ganges, numerous embankments have been erected to check excessive inundation.

Agriculture. Bengal is an agricultural country, about four-fifths of the population being engaged directly or indirectly in agricultural pursuits. According to official estimates, the total area under cultivation amounts to about 55,000,000 acres, of which over 40,000,000 are under rice, the staple of Bengal; about 11,000,000 acres under cereals, and over 4,000,000 acres under oil-seeds. The land is in some cases held by the farmers direct from the Government, but the practice of subletting land by the *zamindaris* is widespread. Of rice, there are cultivated three varieties: the *bors*, or spring rice, the *aus*, or autumn rice, and the *aman*, or winter rice, the last the most extensively cultivated of the three varieties. Of late the cultivation of jute (largely used in the manufacture of bagging) has increased to a considerable extent, and in some parts has even replaced rice. Indigo, once a very important product, receives only scanty attention from the native farmer; its cultivation is confined chiefly to the European plantations, and it is still an important crop, especially in Central Bengal. Among other products are tea, cinchona, opium (the cultivation of which is a Government monopoly), and silk.

The manufacturing industries of Bengal have not only not kept pace with the agricultural development of the country, but have in many instances even retrograded. Many of the native industries, such as the manufacture of dyes and the finer silks, as well as minor articles of general consumption, have almost disappeared, and the local demand for these articles is supplied largely by British manufacturers. Of late a number of large mills equipped with modern machinery have been established by Europeans in the larger centres of population. In the rural districts, however, a large part of the population, formerly engaged in industrial pursuits, have turned their attention to agriculture. The decline of the native industries is due largely to the development of railway transportation, which has enabled the machine-made goods of Great Britain to compete with the local hand-made articles. Taking into consideration the fact that the principal railway lines of Bengal were constructed at the expense of the State—i.e. of the native taxpayers—it may be doubted whether, on the whole, the natives have received a fair return for their outlay.

The foreign commerce of Bengal is considerable, and has been steadily increasing. The seaborne import trade shows an increase from Rs241,386,662 ($78,200,000) in 1885 to Rs353,644,924 ($114,600,000) in 1900, a gain of more than 46 per cent. in 15 years. The export trade has increased during the same period from Rs331,332,660 ($107,350,000) to Rs506,593,287 ($164,136,000), or nearly 53 per cent. The imports consist mostly of cotton piece goods and cotton twist and yarn, which come almost exclusively from Great Britain; metals, mineral oil, machinery, and sugar. Of the exports, about one-fifth consists of opium and rice, and the rest of seeds, indigo, wheat, cotton, etc. The annual trade with Great Britain amounts to about $160,000,000, nearly equally divided between exports and imports. Outside of Great Britain, Bengal deals with China, the United States, Germany, and the Straits Settlements. Bengal has about ten ports, but by far the largest part of the trade passes through Calcutta. Internal communication is facilitated by numerous navigable rivers, as well as by roads and railway lines. Of roads, Bengal has about 40,000 miles, of which only about one-eighth is macadamized. The railway system includes three main lines—one leading from Calcutta toward the northwest; a second eastward; the third to Madras. The total length is about 22,500 miles.

Government. Owing to the heterogeneity of the population of Bengal and the wide dissimilarity in the intellectual capacity of the inhabitants, the government of Bengal has been highly centralized. At the head of the administration is the Lieutenant-Governor, who practically exercises the executive power unassisted by any political body. The legislative power is nominally shared by him with the Legislative Council, which consists partly of members elected by the people; but even this nominal attempt at representative government is practically invalidated by the provision which demands the sanction of all measures by the Viceroy or the Secretary of State for India before they are introduced in the Council. Thus a territory exceeding the area of the British Isles by one-fourth, and with nearly twice their population, is governed by a few officials, without allowing the natives a voice in the management. For administrative purposes Bengal is divided into nine divisions. five in Bengal proper, two in Behar, one in Orissa, and one in Chota-Nagpur. These divisions are administered by commissioners, who have entire charge of their respective territories, and have under their control the district officers. The latter are in charge of the districts into which every division is subdivided, performing the executive, legislative, and judicial functions. The functions of the High Court of Calcutta are mostly supervisory; but it has also original jurisdiction within the limits of Calcutta. Every district officer is also at the head of the police department, which is directly managed by a superintendent of police. In the larger municipalities (of which there are very few in Bengal) the government is more representative in character, and taxpayers are accorded the privilege of electing their representatives to the municipal board.

Education is provided for partly by the Government schools, partly by schools aided by the Government, and partly by private schools. The report for 1900 gives the number of schools of the first kind as 372, with an attendance of about 40,000; of the second, about 39,000, with an attendance of nearly 1,190,000; and of the third kind, over 25,000, with an attendance of about 460,000. These educational institutions include 44 art colleges, 471 high English schools, 950 middle English schools, 1045 middle vernacular schools, and 504 special schools of all kinds.

The Bengal Army is the term applied to the troops raised in Bengal for service with the Indian native army. The cavalry troops of the Bengal Army, and particularly the lancer regiments, are world-famous.

Finance. The Imperial revenue is derived chiefly from the opium monopoly (over 35 per cent.), land-rent (about 22 per cent.), the salt monopoly, and customs. The Imperial expenditures amount usually to less than one-fourth of the revenue, and the surplus is partly utilized to cover the military expenditures both in Bengal and in other parts of India, and partly spent on public works. The cost of the administration of the province is covered by the provincial and municipal taxes.

The population of Bengal is as follows:

	1891	1901
Bengal Proper	38,277,339	41,278,085
Behar	24,393,504	24,185,870
Chota-Nagpur	4,628,792	4,898,693
Orissa	4,047,352	4,350,372
Native States	3,296,379	3,735,715
Totals	74,643,366	78,448,735

Of the total population of Bengal, including the native States, about 64 per cent. are Hindus, about 32 per cent. Mohammedans, and about 4 per cent. Animistic. There are about 200,000 Buddhists and as many Christians. The prevailing language is Bengali, or Bengalese, one of the most important modern Aryan tongues of India, spoken by some 40,000,000 people. Besides the speakers of Aryan dialects, there are in this province several more or less numerous aboriginal peoples (Santals, Kols, Gonds, Bhuiyas, Oraons, etc.) of Dravidian or Kolarian stock, with others in the eastern parts of Indo-Chinese affinities, while the rest consists of Jains, Sikhs, Parsis, and Jews.

Behar, the northern part of Bengal, anciently a powerful Sanskrit monarchy, was conquered about A.D. 1200 by the Mohammedans, and was ruled until 1576 by governors who enjoyed at different times almost independent authority. The first British commercial settlement was made about 1620. In 1686 the English bought, from the grandson of Aurungzeb, the site of the present Calcutta. In 1757 Clive's victory, gained against odds of twenty to one, transferred Bengal from the Mogul's viceroy to the English East India Company, which was secured in its possession by the Mogul's own grant of 1765. Warren Hastings consolidated the British power in Bengal (1772-85). Under him and his successors the civil administration was thoroughly organized and important land legislation enacted. After the treaties of 1765, which placed Bengal, Behar, and Orissa under British administration, the history of Bengal merges with that of British India. See India, and its bibliography.

BENGAL, Bay of. A portion of the Indian Ocean, of almost triangular form, projected northward between India and Farther India. Its southern side, drawn from Coromandel to Malacca, so as merely to leave on the right both Ceylon and Sumatra, may be stated at 1200 miles. Its northern extremity, from Balasore to Chittagong, measures about 250 miles. The Bay of Bengal receives many large rivers—the Ganges and the Brahmaputra on the north, the Irrawaddy on the east, and on the west the Mahanadi, the Godavari, the Krishna, and the Kaveri. On the western coast there is hardly anything worthy of the name of harbor; while on the east there are many good ports, such as Akyab, Cheduba, Negrais, Syriam, Martaban, Tavoy River, King's Island, besides several more in the islands between Pegu and Sumatra. The Andaman and Nicobar islands are situated in the eastern part of the bay. The northeastern and southwestern monsoons prevail, respectively, in summer and winter over the whole of the northern part of the Indian Ocean, which includes the bay, and also over the maritime tracts of Bengal.

BENGAL ARMY. See BENGAL.

BENGALESE, bĕn′ga̤-lēz′. See BENGAL.

BENGALI (bĕn-gä′lē) **LAN′GUAGE AND LIT′ERATURE.** The Bengali language is a modern Indian dialect, akin to the Uriya and to the Hindustani (q.v.). Like all the modern Indian languages, it is analytic in type, and the structure of its grammar thus resembles that of modern Persian or English. According to the latest census, Bengali is spoken by about 42,000,000 souls. There are numerous dialects, but the Calcutta dialect may be regarded as the standard, although the literary language differs widely from any of its vernaculars, on account of the introduction of Sanskrit words, which are employed more freely in Bengali than in any other modern Indian language. The Bengali uses a peculiar but beautiful character derived from the Devanagari or Sanskrit alphabet. The Bengali literature falls into three periods, the first of which, from the Fourteenth to the Sixteenth Century, comprises chiefly Krishnaitic hymns. In the next period, which lasted until the Eighteenth Century, a Sivaite tone was imparted to the literature, and translations of the great Sanskrit epics, the *Mahabharata* and the *Ramayana*, were made. The third period of Bengali literature is marked by the struggle of two opposing schools, the one drawing its inspiration from the Sanskrit classics, and the other working in sympathy with European ideals. Several novels have been produced under this new inspiration in Bengali, and an attempt has also been made to revive the popular Bengali plays, or Jatras.

Consult: Beames, *Grammar of the Bengali Language* (Oxford, 1894); Nicolls, *Manual of the Bengali Language* (London, 1894); Sen, *English-Bengalee Dictionary* (Serampore, 1834); G. C. Haughton, *Bengali, Sanskrit, and English Dictionary* (London, 1833); Bullorampaul & Co., *Prakriti Bibeca Abhidana*, an etymological dictionary of the Sanskrit and Bengali languages (Calcutta, 1893); and Dutt, *The Literature of Bengal* (Calcutta, 1895).

BENGAL LIGHT. See BLUE LIGHT.

BENGAZI, bĕn-gä′zē (anciently, *Berenice*). A seaport town, the capital of the Turkish Vilayet of Barca, North Africa, finely situated on the east coast of the Gulf of Sidra (Map: Africa, G 1). It has a ruined castle, a pretentious bazar, and a Franciscan monastery. Its harbor is shallow, but of considerable commercial importance The chief exports are ivory, ostrich-feathers, and animals. Bengazi is the centre of a fertile region, and controls an important trade with the interior by caravans. The population, estimated at 15,000, includes about 1200 Europeans, chiefly Maltese, Greeks, and Italians. Bengazi is the ancient Hesperides, which was named Berenice by Ptolemy III., in whose time it was a flourishing town.

BENGEL, bĕng′el, JOHANN ALBRECHT (1687-1752). A German theologian and commentator He was born at Winnenden, in Württemburg, June 24, 1687. After completing his theological curriculum in 1707, at Tübingen, he became curate of Metzingen; a year after he was appointed tutor in theology at Tübingen. Later in life he held several high offices, among others that of consistorial councilor and prelate of Alpirsbach, in Württemburg, where he died November 2, 1752. He was the first Protestant author who treated the exegesis of the New Testament in a thoroughly critical and judicious style. He did good service also in the rectification of the text of the Bible, and in paving the way for classifying the sacred manuscripts into families. The short notes in his *Gnomon Novi Testamenti* (Tübingen, 1742) have been generally regarded as valuable, and translated into various languages (Eng. edition, Philadelphia, 1862). They were especially made use of by John Wesley in his *Notes on the New Testament*, which forms one of the standards of Wesleyan Methodism. Indeed, Wesley's work may be regarded as little more than an abridged translation from Bengel. *Erklärte Offenbarung Johannis* (Stuttgart, 1740), and a chronological work, the *Ordo Temporum a Principio per Periodos Œconomiæ Divinæ Historicus atque Propheticus* (Tübingen, 1741), gained for Bengel, in his time, a great reputation; some regarding him as an inspired prophet, but the majority as a visionary. In these works he calculated, on the basis he supposed to be laid down in the Apocalypse, that the world would endure for the space of 7777 7-9 years, and that the "breaking loose and the binding of Satan" would take place in the summer of 1836. For his biography, consult: H. P. Burk (Stuttgart, 1831; Eng. trans., London, 1837); Oscar von Wächter, *Bengel, Lebensabriss* (Stuttgart, 1865).

BENGUELA, bĕn-gä′lȧ, or **BENGUELLA.** One of the five districts into which the Portuguese colony of Angola (q.v.) is divided (Map: Congo Free State, B 5). It is situated between Loanda and Mossamedes, in the most mountainous part of that colony. Capital, Benguela.

BENGUELA, or **BENGUELLA.** A seaport town, the capital of the district of the same name of the Portuguese colony of Angola, West Africa (Map: Congo Free State, B 5). Situated in about latitude 12° 34′ S., and longitude 13° 20′ E., it lies in an exceedingly unhealthy region, near the mouth of the Kavako River, on the Bahía das Vacas. It has an open roadstead, and exports rubber, coffee, ivory, and skins. Population, about 3000, mostly natives. Benguela was founded in 1617 as San Felipe de Benguela. Before the suppression of the slave-trade it had a greater population than at present, and was of considerable importance as a slave-trade centre.

BENHA′DAD I. King of Damascus, son of Tabrimmon. He reigned c.885-844 B.C. He was the ally of Asa of Judah (c.933-877) against Israel, and he fought against Ahab (c.875-853) with varying success. On the other hand, he seems to have been able to cope with Shalmaneser II. (860-825), both at Karkar in 854 and in 849-848. The Assyrian inscriptions refer to him as IM-'idri, which may be read either Biridri or Adad-idri. Possibly his full name was Ben-Adadidri ('the son of Adad is my glory'), abbreviated as Ben Hadad by the Hebrews and Adadidri by the Assyrians. He was probably murdered by Hazael, who usurped his throne, according to II. Kings viii. 9-15.

BENHADAD II. King of Damascus, son of Hazael. He reigned c.804-774 B.C. The Assyrians called him Mari'. Possibly his full name was Ben-Adad-mari ('the son of Adad is my lord'). In 803 he was obliged, after a siege of Damascus, to pay tribute to Adad-nirari III. of Assyria. He continued the oppression of Israel begun by his father.

BENHAM, běn'*am*, ANDREW ELLICOTT KENNEDY (1832—). A United States naval officer, who retired in 1894. He was born in New York State, and entered the navy as a midshipman in 1847. He served in the East Indies until 1851, became a lieutenant in 1855, and in 1861 took command of the *Bienville*, in the South Atlantic Blockading Squadron, and participated in the capture of Port Royal, S. C. He was made commander of the gunboat *Penobscot* in 1862, and served in the Western Gulf Blockading Squadron until the close of the war. He served at the Brooklyn Navy-Yard (1868-69), was lighthouse inspector (1870-71 and 1884-88), and was promoted to be commodore in 1886, and rear-admiral in 1890.

BENHAM, HENRY W. (1817-84). An American soldier, born at Cheshire, Conn. He graduated at the United States Military Academy in 1837, was connected with various Government works as a member of the Engineer Corps, and served in the Mexican War in 1847-48. From 1849 to 1852 he was superintending engineer of the sea-wall for the protection of Great Brewster Island, Boston (Mass.) Harbor, and from 1852 to 1853 of the Washington (D. C.) Navy-Yard. In 1861 he was appointed engineer of the Department of the Ohio; in the same year was promoted to be brigadier-general of volunteers, and commanded a brigade at New Creek, and from 1863 to 1865, with rank of lieutenant-colonel, was in command of the engineer brigade of the Army of the Potomac. He was mustered out of the volunteer service with rank of brevet major-general, U.S.V. and U.S.A. Promoted to be colonel in 1867, he was in charge of the Boston Harbor sea-wall from 1866 to 1873, and of the defenses of New York Harbor from 1877 to 1882.

BENHAM, WILLIAM (1831—). An English clergyman and author. He was born at West Meon, Hampshire, where both his father and his grandfather had occupied the position of village postmaster. He was educated at King's College, London, and in 1864 became editorial secretary to the Society for Promoting Christian Knowledge, and professor of modern history at King's College. In 1867 he was selected by Archbishop Longley as his private secretary, and in 1872 was appointed one of the six preachers of Canterbury and Vicar of Margate by Archbishop Tait. He became Vicar of Marden in 1880, rector of the Church of Saint Edmund the King in 1882, and honorary canon in Canterbury Cathedral in 1889. In 1897 Bishop Creighton appointed him Boyle Lecturer. He was editor of Griffith and Farran's *Library of Ancient and Modern Theology*, and has published the following: *English Ballads, with Introduction and Notes* (1863); *Readings on the Life of Our Lord and His Apostles* (1880); *Companion to the Lectionary* (1872); *A New Translation of Thomas à Kempis's "Imitatio Christi"* (1874); *Memoirs of Catharine and Craufurd Tait* (1879); *A Short History of the Episcopal Church in America* (1884); *The Dictionary of Religion* (1887); *Life of Archbishop Tait* (in collaboration with the Bishop of Winchester, 1891).

BEN'-HUR' (Heb. *ben*, son + *Ḣur*, a proper name. Οὔρ, *Hour*, or Ὥρ, *Hōr* in the Greek Version of the Bible). The Jewish hero of a very popular novel of that name by Gen. Lew Wallace (1880). It is a story of Judea in the days of Christ.

BENI, bā'nê. One of the largest departments of Bolivia, occupying the northeastern part of the Republic, and bounded by Brazil on the north and east, by the departments of Cochabamba, La Paz, and Santa Cruz on the south, and La Paz on the west (Map: Bolivia, D 6). Its area is estimated at 100,000 square miles, a large portion of which has not yet been explored. The surface is mostly flat and the soil very fertile, producing cacao, coffee, sugar-cane, tobacco, tropical fruits, etc. The natural resources comprise also a heavy growth of valuable timber, including vast rubber forests, and deposits of gold. The climate is healthful, though hot and moist. The estimated population of 26,700, mostly Indians, does not include a large number of uncivilized Indians. The capital and chief town of the department is Trinidad, with a population of 6750.

BENI. A river of Bolivia, South America (Map: Bolivia, D 6). It rises in the Bolivian Andes in about latitude 17° S., and flows first northwest, then north, and then northeast, and finally unites with the Mamoré to form the Madeira at Villa Bella, on the northern Bolivian frontier. It drains the eastern slope of the Andes between latitudes 17° S. and 12° S., and receives many tributaries from the west, the largest of which is the river Madre de Dios; but it has few tributaries from the east. It has a length of 900 miles, and is navigable for half this distance; but just above its mouth it is obstructed by rapids.

BENICARLÓ, bā'nê-kär-lō'. A walled town in the Province of Castellón de la Plana, Spain, at the mouth of the Benicarló River, on the Mediterranean, 42 miles northeast of Castellón de la Plana. It contains an old castle and a fine church, distinguished by an octagonal tower. Vine-culture is the chief industry, and the red wine manufactured in the town and district is exported to Bordeaux. Population, in 1897, 7900.

BENICIA, bê-nĭsh'ĭ-ȧ. A city in Solano County, Cal., 33 miles northeast of San Francisco; on the Strait of Karquines, between Suisun and San Pablo bays, and on the Southern Pacific Railroad (Map: California, B 2). It has a good harbor and steam communication with San Francisco. There are tanneries, manufactures of farm implements, wagons, pottery, etc., extensive shipyards, and fruit and fish packing houses. The city contains a United States arsenal and barracks, and a Protestant Episcopal college. Benicia was founded in 1848, and until 1850 was the chief rival of San Francisco. In May, 1853, it was made "the permanent seat of government," but in March, 1854, it was supplanted by Sacramento. It was incorporated in 1861, and is now governed by a charter of 1886, which provides for a mayor, elected every four years, and a city council. Population, in 1890, 2361; in 1900, 2751.

BENICIA BOY. A nickname popularly applied (from his residence in California) to John C. Heenan, the pugilist, whose fight with Sayers is memorable in the history of the sport. See Boxing.

BENI-HASSAN, bā′nê-häs′sȧn, or **HASAN** (Ar. *beni*, sons, descendants, tribe + *Hassan*). A small village in Central Egypt, latitude 27° 53′ N., longitude 30° 55′ E., on the right bank of the Nile. The place is famous for the rock-hewn tombs, 39 in number, which are cut in the calcareous stone of the mountain, in the near vicinity, and are fine examples of Egyptian architectural art. They are sepulchres of the ancient nomarchs who ruled the district under the Middle Empire (about B.C. 2000). The walls of some of the larger tombs are covered with paintings and hieroglyphic inscriptions. The former represent varied scenes of ancient Egyptian life, while the inscriptions form a most important source of information for the history of the Twelfth Dynasty. In recent years the mural decorations have been much injured by relic-hunters. All that remains has been carefully copied, under the auspices of the Egypt Exploration Fund, and published in the *Publications of the Archæological Survey of Egypt*, Vols. I., II., V. (London, 1892, 1893, 1896).

BENI-ISRAEL, bā′nê-ĭz′rȧ-ĕl (Heb., Sons of Israel). The name of a group of people of Jewish origin, settled in the west of India, who, while acknowledging the law of Moses, conform in many respects to the religious customs of the Hindus, by whom they are surrounded. They abstain from the flesh of unclean animals and are strict observers of the Sabbath. A few of their learned men know Hebrew, but the great majority are ignorant of the Old Testament. Their whole number is estimated at 5000. Their original settlement was at Navagaum, about 30 miles from Bombay, where they were protected by the native princes; they have spread through the maritime parts of the Konkan, and some of them are now to be found in Bombay itself. Their features exhibit a resemblance to those of the Arabian Jews. Of their early history and the time of their settlement in India little is known, though it is probable that they came to India before the Jews of Cochin. It has been said that they assumed the name Beni-Israel because that of Jehudim (Jews) was distasteful to Mohammedans; but these and similar stories which make them out to be descendants of the supposed lost tribes have no historical value. Their communities are governed by a *mukaddam* or head man of their own number, and their religious assemblies are presided over by a *cadi*, who also performs circumcision and other rites.

BENI-ISRAEL. A diminutive antelope (*Neotragus Saltianus*), allied to the duikerboks, and common in Abyssinia and along the Red Sea. It is variously called omdigdig, madoqua, hegoleh, and Salt's antelope. In southern Abyssinia (Somaliland) a closely related species, Kirk's antelope (*Neotragus Kirki*), is extremely numerous. They run by long bounds, utter shrill cries, and their flesh has an unpleasant, musky flavor.

BENIN, be-nēn′ (from Lat. *benignus*, kind, good, benign). A former kingdom of Africa, included, since 1897, in the Niger Coast Protectorate. It is bounded by the Niger, Dahomey, and the Bight of Benin (q.v.) (Map: Africa, E 4). The name was formerly applied to the entire coast of Upper Guinea from the estuary of the Volta to that of the Niger, which is also known under the name of Slave Coast (q.v.). The shores are generally low and indented, and the climate unhealthy. The soil is very fertile, and produces rice, yams, and all other products characteristic of Upper Guinea; the interior is well wooded. The chief article of trade is palm-oil. The population of the coast regions consists of Jakris, who are mostly engaged in trade. The inhabitants are little advanced beyond the savage state, and the sacrifice of human beings as a religious custom is of frequent occurrence. The town of Benin, in the eastern part of the region, has an estimated population of 15,000. Benin is supposed to have been discovered by the Portuguese navigator Diogo Cam in 1484. At the end of the Eighteenth Century several French settlements were established near the estuary of the Niger, but were soon destroyed by the British. At that time Benin was the centre of the slave-trade, which was suppressed by the British. Benin was declared a British possession in 1885, but for a long time the authority of the British was merely nominal. In 1897 Benin was incorporated in the Niger Coast Protectorate, and a British Resident placed at the capital. Consult: Roth, *Notes on Benin Customs* (Leyden, 1898); "Primitive Art from Benin," in No. 15 *The Studio* (London, 1898).

BENIN, Bight of. A name applied to that portion of the Gulf of Guinea (q.v.) which extends along the so-called Slave Coast of Africa, from Cape Formosa, the chief mouth of the Niger, westward to Cape Saint Paul, a distance of 500 miles by coast-line (Map: Africa, E 4). The bay is bordered by numerous lagoons, and receives the discharge from a number of rivers. On account of its winds, it is dangerous for shipping. The shores are unhealthy.

BENIOWSKY, bĕn′yŏv-skĭ, Count Moritz August von (1741-86). A Hungarian adventurer, born at Verbó. He served in the Austrian Army during the Seven Years' War, joined the Polish Confederation, was captured by the Russians, and was exiled to Kamchatka, whence he escaped to France. Sent by the French Government to establish a colony in Madagascar, he caused himself to be proclaimed king by several native tribes, and was subsequently killed in a battle with troops sent against him by the governor of the Île de France. His *Memoirs and Travels*, edited by Nicholson and Magelhan, appeared at London in 1790.

BENI-SUEF, bā′nê-swȧf. A town of Central Egypt, capital of the Province of Beni-Suef. It is situated on the right bank of the Nile, about 70 miles south of Cairo by rail (Map: Egypt, E 3). It is the entrepôt of all the produce of the fertile valley of Fayum, and has cotton-mills operated by the State. Population, about 10,000.

BENITIER, bȧ′nê′tyȧ′. See Holy-Water Vase.

BEN′JAMIN. The eponymous ancestor of the tribe of Benjamin. According to biblical tradition, he is the younger son of Jacob and Rachel (Gen. xxxv. 18), named by his mother

Benoni ('child of my sorrow'), but renamed Benjamin by his father. The second element of the name is parallel with the Arabic term Yemen, 'right-south,' as opposed to Shimal, 'left-north' (southern Arabia); and therefore some biblical scholars consider that it is probable that Benjamin was originally a geographical name for a group settled in the southern portion of the Ephraimitic highland (Sam. ix. 10-16). The stories told of Benjamin in Genesis illustrate the predilections of both Judæan and Ephraimitic writers for this tribe. After Joseph was sold into Egypt Benjamin was the pet of his father, and Jacob could only with difficulty be persuaded to allow him to accompany his brothers into Egypt during the famine (ib. xlii. 36; xliii. 6-14). At the time of the migration of Jacob to Egypt Benjamin appears as the head of a family of ten (ib. xlvi. 21), and is already depicted as the ancestor of the tribe of Benjamin. The territory of this tribe in Palestine was between Judah and Ephraim, and included among its important cities Jericho, Bethel, Gibeon, and Ramah, all of which were also important sanctuaries (Josh. xviii. 11, 21-25). Jerusalem seems to have been on the border between Judah and Benjamin. The tribe was one of the most warlike of the whole twelve and, considering that it was a small tribe, played a most important part in Hebrew history. It produced such men as Ehud the Judge (Judges iii. 15ff.) and King Saul (I. Sam. ix. 1-2). After Saul's death it joined in the revolt of his son Ishbosheth (II. Sam. ii. 15); and Sheba, the Benjamite, later led a revolt against David (II. Sam. xx. 1). The strength of the tribe in war proves that its almost total destruction by the rest of Israel for its conduct in connection with the outrage at Gibeah (Judges xix.-xxi.) had no permanent effect, and the account of their destruction is exaggerated. When the kingdom was divided, Benjamin joined with Judah in forming the southern kingdom, or Kingdom of Judah (I. Kings vii. 21, etc.). Modern critics regard the tribe of Benjamin as having originally, with Ephraim and Manasseh, formed the tribe of Joseph (cf. II. Sam. xix. 16, with ib. xix. 20; and note the expression, 'house of Joseph,' in I. Kings xi. 28); and according to the critical view that the stories in Genesis are the echoes of tribal history, this explains the fact that Benjamin is there spoken of as the full brother of Joseph, as it also accounts for the favorable view taken in general by northern writers of Benjamin, despite the fact that it joined Judah in establishing the southern kingdom. For the history of the southern kingdom, composed of Judah and Benjamin, see JEWS.

BENJAMIN OF TUDELA, tōō-ᴅā′lȧ (Benjamin ben Jonah). A Jewish traveler. He was born at Tudela, in Navarre, Spain. He was the first European who gave information respecting the distant East. He made a journey from about 1159 to 1173 (in which year he died) from Saragossa, through Italy and Greece, to Palestine, Persia, and the borders of China, returning by way of Egypt and Sicily. His notes—originally written in Hebrew and translated into Latin, English, German, Dutch, and French—are exceedingly valuable; but, like so many early travelers, he readily accepted miraculous stories which were told him, and his accounts are not always trustworthy. The latest edition, by Asher (London and Berlin, 1840-41), contains the original text, with an English translation and annotations.

BENJAMIN, CHARLES HENRY (1856—). An American mechanical engineer; born at Patten, Maine. He studied at the University of Maine, was professor of mechanical engineering there in 1880-86, and in 1889 became professor of mechanical engineering at the Case School of Applied Science, Cleveland, Ohio. He has published *Notes on Heat and Steam* (1894); *Notes on Machine Design* (1895); and *Mechanical Laboratory Practice* (1898).

BENJAMIN, JUDAH PHILIP (1811-84). An American lawyer and statesman, one of the leaders of the Southern Confederacy during the Civil War. He was born of English-Jewish parentage, in the island of Saint Croix, West Indies; removed with his parents to Wilmington, N. C., in 1815; studied for three years at Yale, and in 1832 was admitted to the bar in New Orleans, where two years later he published a valuable work, entitled *Digest of Reported Decisions of the Supreme Court of the Late Territory of Orleans and of the Supreme Court of Louisiana.* He soon acquired an extensive practice; became a member of the law firm of Slidell, Benjamin, and Conrad in 1840; made a celebrated argument in connection with the 'Creole Case' (q.v.) in 1841, and in 1847 was retained as counsel by the United States commission appointed to adjudicate the Spanish land-titles in California. In 1848 he was admitted to practice before the Supreme Court, and subsequently spent much of his time in Washington. During President Pierce's administration he declined an appointment to a place on the Supreme Court bench. He was United States Senator from Louisiana from 1852 to 1861, and as such took a prominent part, on the Southern side, in the various debates over slavery extension, the organization of the Territories, 'popular sovereignty,' and 'State rights.' In February, 1861, he withdrew from the Senate, and soon afterwards was appointed Attorney-General in President Davis's provisional Cabinet. On the resignation of L. Pope Walker, in August, he became Secretary of War, but soon resigned, owing to Congressional charges of incompetence and negligence, and in February, 1862, accepted the position of Secretary of State. In this capacity he served with remarkable energy and efficiency until the close of the war, working habitually from 8 A.M. until 2 A.M. each day, and soon became generally known as 'the brains of the Confederacy.' Upon the surrender of Lee at Appomattox, Benjamin fled from Richmond, together with the other officials of the Confederacy, and after undergoing many hardships finally reached England in September, 1865. He then entered as a student at Lincoln's Inn, London; was called to the English bar in June, 1866; and in 1868 published *A Treatise on the Law of Sale of Personal Property*, which came to be regarded as a legal classic in England. Benjamin gradually acquired an enormous practice, at first in *nisi prius* cases, and afterwards in cases of appeal before the Privy Council and the House of Lords; but in 1883 he was forced by failing health to retire from the bar. Many of his speeches in the Senate and a number of his arguments before the courts in important cases in both America and England have been published.

BENJAMIN, Marcus (1857—). An American chemist and editor. He was born in San Francisco, Cal. He graduated from the School of Mines, Columbia College, in 1878; became editor of the *American Pharmacist*, and later of the *Weekly Drug News*, and in 1883 was appointed chemist to the United States laboratory of the Appraiser's stores at New York. From 1884 to 1886 he was lecturer on chemistry at the New York Woman's Hospital Medical College, and in 1889 the degree of Ph.D. was conferred upon him by the University of Nashville. Since 1896 he has been editor to the United States National Museum in Washington. He is a member of numerous scientific and patriotic societies in this country, a life fellow of the London Chemical Society, etc. Dr. Benjamin's publications include articles on "Mineral Paints" in the volumes of the *Mineral Resources of the United States* for 1883-86 (published by the United States Geological Survey), and contributions to various works of reference.

BENJAMIN, Park (1809-64). An American journalist and poet. He was born in British Guiana, August 14, 1809, but was early sent to New England, where he became a graduate of Trinity College. He practiced law in Boston, but preferred editorial work there, and later in New York. In 1840 he helped to found *The New World*, and after other brief editorial ventures became a lecturer, public reader, and periodical writer, prominent in New York literary circles. He is now known only through his shorter poems, of which "The Old Sexton" is a favorite of the anthologist.

BENJAMIN, Park (1849—). An American patent-lawyer and writer. He was born in New York City, graduated at the United States Naval Academy in 1867, resigned from the navy in 1869, and graduated at the Albany Law School in the following year. He was associate editor of *The Scientific American* from 1872 to 1878, and subsequently edited Appleton's *Cyclopædia of Applied Mechanics* and *Cyclopædia of Modern Mechanism*. Besides numerous magazine articles dealing for the most part with scientific subjects, he has published: *Shakings or Etchings from the United States Naval Academy* (1867); *Wrinkles and Recipes* (1875); *The End of New York* (1881); *The Age of Electricity* (1886); *The Voltaic Cell* (1892); *The History of Electricity* (1895); a *History of the United States Naval Academy* (1900).

BENJAMIN, Samuel Green Wheeler (1837—). An American author and artist. He was born at Argos, Greece, studied at the English College in Smyrna, and in 1859 graduated at Williams College. He was assistant librarian in the New York State Library in 1861-64, served in hospitals, studied law, and for several years art, and was United States Minister to Persia in 1883-85. He frequently contributed to periodical literature, and is the author of *Art in America* (1879); *Troy: Its Legend, History, Literature* (1881); *A Group of Etchers* (1882); *Persia and the Persians* (1886); and several other works. He is also known as an illustrator and marine painter.

BENJAMIN - CONSTANT, bäɴ′zhä′mäɴ′ kôɴ′stäɴ′, Jean Joseph. See Constant.

BEN JOCHANAN, bĕn jō-kā′*nan*. A character in Dryden and Tate's *Absalom and Achitophel*, representing the Rev. Samuel Johnson. He is described in the second part of the poem, lines 351-354.

BEN′KELMAN. A village and county-seat of Dundy County, Nebraska, in the southwestern part of the State; on the Republican River, and on the Burlington and Missouri River Railroad (Map: Nebraska, C 3). Agriculture and stock-raising are the principal industries. Population, in 1890, 357; in 1900, 296.

BENKERT, bĕn′kĕrt, Karl Maria. See Kertbény, Karl Maria.

BENKULEN, or **BENCOOLEN** (Dutch, *Benkoelen*), bĕn-ko͞o′len. A picturesque little town, and the capital of the residency of the same name, on the western coast of Sumatra, situated in latitude 3° 48′ S. and longitude 102° 16′ E. (Map: East Indies, B 5). During the occupation of the British, by whom it was founded in 1686, it rose to some eminence as a commercial place. It was ceded to the Dutch in 1825, and has since then gradually lost its commercial importance. Population about 7000.

BEN LED′I. A mountain of Perthshire, Scotland, 4 miles west-northwest of Callander, with an elevation of 2875 feet (Map: Scotland, D 3). It received its name from the Druids, who celebrated the Beltane mysteries on its summit—the Gaelic words *Beinn le Dia* signifying 'hill of God.' This mountain is celebrated in Scott's *Lady of the Lake*.

BEN LO′MOND (Gael. *ben*, mountain + lake *Lomond*). A mountain in the northwest of Stirlingshire, Scotland, on the east side of Loch Lomond, 27 miles west-northwest of Stirling (Map: Scotland, D 3). It forms the southern extremity of the Grampians or Central Scottish Highlands, is 3192 feet high, and consists of mica slate, with veins of quartz, greenstone, and feldspar porphyry. From the summit a sheer precipice of 2000 feet descends on the north side, and a gentle declivity on the southeast; it is covered with vegetation to the top, and is much frequented by tourists. It is the source of Duchray Water, one of the feeders of the Forth. The view from the summit, in clear weather, takes in Loch Lomond, with its diversified isles, the rich plains of Stirlingshire and the Lothians, the windings of the Forth, the castles of Stirling and Edinburgh, the heights of Lanarkshire, the vales of Renfrewshire, Ayrshire, Firth of Clyde, isles of Arran and Bute, the Irish coast, Kintyre, and the Atlantic. The northern horizon is bounded by Ben Lawers, Vorlich, Ledi, Cruachan, and Nevis, while some of the beautiful Perthshire lochs are seen.

BEN MACDHUI, mäk-do͞o′ē (Gael. *Beinn-na-muc-dubh*, the mountain of the black sow). A mountain on the border of southwestern Aberdeenshire and Banffshire, Scotland, one of the Cairngorms, and, after Ben Nevis, the loftiest in the country (Map: Scotland, E 2). Height, 4296 feet.

BEN′MORE′ HEAD. See Fairhead.

BENN′DORF, Otto (1838—). A German archæologist. He was born at Greiz, studied philology at Erlangen and Bonn (1857-62), and traveled in Italy and Greece (1864-68), largely at the expense of the German Archæological

Institute. He has successively occupied the chair of archæology at Göttingen (1868), Zurich, Munich, Prague, and Vienna, where he became director of the Archæological Institute in 1898. He was a member of the archæological expeditions to Samothrace (1875) and Asia Minor (1881-82). Among his numerous works are the following: *Die antiken Bildwerke des lateranensischen Museums* (in collaboration with R. Schöne, 1867); *Antike Gesichtshelme und Sepulkralmasken* (1878); *Reisen im südwestlichen Kleinasien* (1884); *Reisen in Lykien und Karien* (1884).

BENNET, Elizabeth. A character in Jane Austen's novel *Pride and Prejudice.* Her pride compels her to refuse Mr. Darcy's offer of marriage, at first; but later, his perseverance overcomes her prejudice. Consult W. D. Howells's *Heroines of Fiction* (1901).

BENNET, Henry, Earl of Arlington (1618-85). An English statesman in the reign of Charles II. In the beginning of the Civil War he was under secretary to Lord Digby, and afterwards volunteered in the royal cause, and did good service, especially at Andover, where he was wounded. He was made secretary to the Duke of York; was knighted by Charles at Bruges in 1658, and was sent as envoy to the Court of Spain. After the Restoration he was made keeper of the privy purse and principal Secretary of State. In 1670 he became a member of the famous 'Cabal,' and was one of those who advised the closing of the exchequer. In 1672 he was made Earl of Arlington and Viscount Thetford, and soon afterwards a Knight of the Garter. His *Letters to Sir William Temple* were published posthumously.

BEN'NETT, Alfred Allen (1850—). An American chemist, born at Milford, N. H. He graduated at the University of Michigan in 1877, and took the degrees B.Sc. and M.Sc. at the same institution ten years later. He has been professor of chemistry and physics at the Iowa Wesleyan University and the University of Chicago. In 1885 he was appointed professor of chemistry in the Iowa State College. He has written *Inorganic Chemistry,* 2 vols. (1895), and several articles for scientific publications.

BENNETT, Alfred William (1833-1902). An English botanist, born at Clapham. He studied at University College, London, and was appointed examiner in botany to the University of Wales. Subsequently he became lecturer on botany at Saint Thomas's Hospital, London. He was at one time vice-president of the Linnæan Society. His publications include a *Handbook of Cryptogamic Botany* (with G. Murray, 1889), and *Flora of the Alps* (1896).

BENNETT, Charles Edwin (1858—). An American classical philologist, born in Providence, R. I., April 6, 1858; A.B. Brown University, 1878; professor of Latin, University of Wisconsin, 1889-91; of classical philology, Brown University, 1891-92; of Latin, Cornell University, 1892. Author of *A Latin Grammar and Appendix* (1895); *Latin Composition* (1895); *Foundations of Latin* (1898); joint author of the *Teaching of Greek and Latin in Secondary Schools* (1898); editor of various classical authors; and contributor to philological journals.

BENNETT, Charles Wesley (1828-91). An American scholar and educator, born at East Bethany, N. Y. He graduated in 1852 at Wesleyan University, and in 1856 became principal of the Genesee Wesleyan Seminary, at Lima, N. Y. In 1860 he was appointed superintendent of public schools in Schenectady, N. Y., and in 1861 became principal of the Louisville (N. Y.) Academy. He was ordained to the ministry of the Methodist Episcopal Church in 1862. From 1866 to 1869 he traveled and studied at the University of Berlin, and in 1871 was called to the chair of history and logic in Syracuse University. From 1885 until his death he was professor of historical theology in the Garrett Biblical Institute, Evanston, Ill. He published a *Digest of the Laws and Resolutions of Congress Relative to Pensions, Bounty-lands,* etc. (1854); a *History of the Philosophy of Pædagogics* (1877); *National Education in Italy, France, Germany,* etc. (1878); and *Christian Archæology* (1888).

BENNETT, Edward H. (1837—). An Irish surgeon, born in Cork. He graduated at Trinity College, Dublin, and was appointed professor of surgery in the University of Dublin in 1873. In 1897-1900 he was president of the Royal Academy of Medicine in Ireland. He has published *Ankylosis of the Hip* (1874); *Fractures of the Rib* (1878); and other surgical works.

BENNETT, James Gordon (1795-1872). An American journalist, born at New Mill, Banffshire, Scotland. He studied for the Roman Catholic priesthood at the seminary of Aberdeen, and in 1819 emigrated to Halifax, N. S. Thence, after a brief and highly unsuccessful career as an instructor in bookkeeping, he proceeded to Boston, where he became a proofreader in the establishment of Wells and Lily, then publishers of the *North American Review.* In 1822 he was appointed Spanish translator and general assistant in the office of the Charleston (S. C.) *Courier.* Subsequently he appears as a paragraphist in New York, and in 1828-32 as Washington correspondent of the *Enquirer.* For thirty days, in 1832, he published the *Globe,* and in 1833-34 was part owner and principal editor of the Philadelphia *Pennsylvanian.* Through both journals he was a vigorous partisan of Jackson and Van Buren, by whom he was totally and irritatingly ignored. On May 6, 1835, from a cellar at No. 20 Wall Street, he issued the first number of the *New York Herald*—a lively little sheet of four four-column pages. On June 13 he included in the *Herald* the first Wall Street financial article printed in any newspaper in the United States, and in December introduced modern American reportorial methods by his graphic accounts of the great fire, to which were added a picture of the burning Exchange, and a map of the devastated district. He obtained the transmission by telegraph of the first speech ever thus reported in full—that of Calhoun on the Mexican War. He wrote trenchant, often cynical, editorials, which made enemies for the writer, but increased the circulation of his paper. But his chief aim was the collection and dissemination of contemporaneous intelligence, in illustration of which may be cited the fact that during the Civil War he maintained an extra staff of 63 correspondents at an expense for four years of $525,000. At the time of his death the profits of the *Herald* were estimated at not far from $750,000 yearly. He was frequently accused of utter lack of conviction. James Parton wrote, in 1867, that "His paper is generally read and its proprietor universally disapproved." It may at least be said that his civic principle was not lofty, who declared: "We have never been in a minority, and we never shall be." Consult Parton, *Famous Americans of Recent Times* (Boston, 1867).

BENNETT, JOHN HUGHES (1812-75). An English physician and physiologist. He was born in London, and entered the University of Edinburgh in 1833, where J. H. Balfour, Edward Forbes and John Reid were among his fellow students. After his graduation, in 1837, he studied two years in Paris, where he founded the Parisian Medical Society, and became its first president. On his return to Edinburgh in 1841 he published his famous treatise on *Cod-Liver Oil as a Therapeutic Agent in Certain Forms of Gout, Rheumatism, and Scrofula.* The remedial properties of this oil had long been known to the fishermen of Scotland, and had been prescribed by physicians in the Manchester Infirmary. But it was not until the publication of Dr. Bennett's pamphlet (1841), and that of Dr. C. J. B. Williams (1848), that the drug was generally introduced. As lecturer on histology at Edinburgh, Dr. Bennett was the first to give systematic instruction in this subject. He was also one of the pioneers in the employment of the microscope in clinical pathology. In 1848 he was the unanimous choice for the office of professor at the Institute of Medicine in Edinburgh, and he held this position until his resignation in 1874. The remarkable decrease in the mortality of pneumonia was also due to his efforts, and was largely the result of his revelation of the dangers attending the so-called antiphlogistic method of treating this disease. He published in all 105 papers and memoirs, most of them of great importance. Especially celebrated among his larger works are the *Clinical Lectures on the Principles and Practice of Medicine* (5th ed., 1868). Six editions of this work were, prior to 1875, published in the United States alone, and translations of it have been made in French, Russian, and Hindu.

BENNETT, WILLIAM COX (1820-90). An English poet. He was born at Greenwich, where he continued the business of his father, who was a watchmaker. His first productions were published anonymously in 1843 and 1845. They were followed by *Poems* (1850); *Verdicts* (1852); *War Songs* (1855); *Queen Eleanor's Vengeance, and Other Poems* (1857); *Baby May* (1859); *Songs for Sailors* (1872); *Sea Songs* (1878); *Songs for Soldiers* (1879); *Prometheus the Fire-Giver* (1877); *The Lark; Songs, Ballads, and Recitations for the People* (1885).

BENNETT, Sir WILLIAM STERNDALE (1816-75). An eminent English pianist and composer, born at Sheffield. He studied under Holmes, Potter, and Crotch in the Royal Academy, London; attracted the notice of Mendelssohn at the Düsseldorf Musical Festival in 1836; appeared with success at Leipzig in the winters of 1837-38 and 1838-39; and was received with great applause when he returned to London. In 1838 he was elected member of the Royal Society of Musicians. He visited Germany again in 1842, and became well acquainted with both Mendelssohn and Schumann. He had a prominent share in the foundation of the Bach Society in 1849; was appointed conductor of the Philharmonic Society in 1855, succeeding Richard Wagner; and in the following year was elected professor of music at Cambridge. In 1868 he was appointed principal of the Royal Academy of Music, and was knighted in 1871. He stood foremost among contemporaneous English musicians, was a pianist of the first rank, and a composer of exquisite grace and refinement. His principal works are: "The May Queen," a cantata; the overtures "The Naiads," "Wood Nymphs," "Parisina," and "Paradise and the Peri"; the oratorio, "The Woman of Samaria"; music to the "Ajax" of Sophocles; four concertos for pianoforte, and a symphony.

BENNETT'S GAZELLE, gȧ-zĕl′. See GAZELLE.

BEN NEV′IS (Gael., probably *ben*, mountain + *nevis*, snow, Lat. *nix*, gen. *nivis*, snow; cf. Sp. *Sierra Nevada*, snowy range, and Engl. *Snowdon* = snow + down). The highest mountain in Great Britain, in Inverness-shire, Scotland (Map: Scotland, D 3). It has a height of 4406 feet, with a precipice of 1500 feet on the northeast side. Granite and gneiss form the base of the mountain, which exceeds 24 miles in circumference; the upper part is composed of porphyry. A road leads to the summit, where a meteorological observatory was erected in 1883.

BENNEWITZ, bĕn′ne-vĭts, or **BIENEWITZ**, PETER. See APIANUS, PETRUS.

BENNEWITZ VON LOEFEN, fōn lē′fen, KARL (1826-95). A German landscape painter, born at Thorn, and educated by W. Schirmer in Berlin and Albert Zimmermann in Munich. He selected his subjects almost entirely from the scenes of northern Germany, its simple villages, monotonous plains, and bleak stretches of coastland. Of his numerous works the following are especially noteworthy: "Wood Path," "Village in Brandenburg," "Autumn Fog," "Outlook on Baltic Sea," "On the Heath," "Beech Wood on Rügen."

BENNIGSEN, bĕn′nĭк-sĕn, LEVIN AUGUST THEOPHILUS, Count (1745-1826). A Russian general. He was born in Brunswick and entered the Russian service in 1773, and distinguished himself in the wars against the Turks, in Poland, and at Derbend in Persia. Bennigsen was one of the leaders of the conspiracy against the Emperor Paul (1801). He fought with considerable success in the battle of Pultusk (1806), and held the chief command in the obstinate and murderous struggle at Eylau (1807). In 1812 Bennigsen commanded the Russian centre at Borodino, and gave his voice for fighting a second battle before the walls of Moscow. Before the French began their retreat he gained a brilliant victory over Murat at Taratino, October 18. Differences with Kutusoff, who would not adopt Bennigsen's plan to prevent the French from crossing the Beresina, made him retire from the army; but after Kutusoff's death he took the command of the Russian army of reserve, which entered Saxony in July, 1813, and fought victoriously at the battle of Leipzig. He was created a count by Emperor Alexander on the field. He participated in the pursuit of the French army, and besieged Hamburg. Failing health made him retire from the Russian service in 1818 to his paternal estate in Hanover.

BENNIGSEN, Rudolf von (1825-1902). A German statesman. He was born at Lüneburg, Hanover, and at an early stage became prominent and influential in the political life of his native land. After the annexation of Hanover to Prussia in 1866, he was elected to the North German Diet and the Prussian Assembly and became vice-president of both bodies. In 1871 he was elected to the German Reichstag, where he rose to great prominence as the leader of the National Liberal Party. He was equally conspicuous in the Prussian Assembly, over which he presided from 1873-79. He was for years a warm supporter of Bismarck, but after 1878 opposed the laws against the Socialists and equally the economic policy of the Government. After the more liberal wing of the National Liberals seceded (1880), Bennigsen continued to lead the party on a more conservative basis. He resigned his mandate in the Prussian Assembly and the Reichstag in 1883, but reëntered politics in 1887, and once more became the leader of the National Liberal Party, thenceforth generally in accord with the Government. He became President of the Province of Hanover in 1888, but resigned his position in 1898.

BEN'NINGTON. A village and the county-seat of Bennington County, Vermont, 37 miles northeast of Troy, N. Y.; on the Rutland and the Lebanon Springs railroads (Map: Vermont, B 10). It is noted as a manufacturing centre, producing extensively knit goods, woolens, hosiery, machinery, needles, shirts, collars, cuffs, etc. Bennington is the seat of a State Soldiers' Home. The government, under a charter of 1885, is administered by a village president and a board of trustees, chosen at town meetings, which are convened annually, and at special times on call. Settled in 1761, and named in honor of Governor Benning Wentworth of New Hampshire, Bennington was for many years—before the recognition of Vermont as a State—claimed both by New York and New Hampshire. It was the home of Seth Warner and Ethan Allen, and on August 16, 1777, was the scene of the battle of Bennington (q.v.). A battle monument over 300 feet high, commemorative of this event, has been erected in Bennington Centre. Population, in 1890, 3971; in 1900, 5656. Consult Merrill and Merrill, *Sketches of Historic Bennington* (Cambridge, 1898).

BENNINGTON, Battle of. A battle fought on August 16, 1777, during the American Revolution, between a force of Hessians, British, Loyalists, and Indians, under Colonel Baum, and a superior force of New Hampshire militia, under General Stark. On the 13th, Burgoyne had sent Baum with a detachment of 700 (including 150 Indians) to capture the dépôt of supplies at Bennington, and on the 15th had sent Colonel Breyman with a reinforcement of 640 Hessians. Baum was attacked at 3 P.M. on the 16th by Stark, at the head of about 2000 militia, and before the arrival of Breyman nearly his whole force had been killed, wounded, or captured, he himself being mortally wounded early in the engagement. Stark, reinforced by 500 men under Seth Warner (q.v.), then turned upon Breyman, and by nightfall had almost annihilated his army. The British loss is estimated at 207 killed and 700 captured (including the wounded); the American at 40 killed and 42 wounded. The victory greatly weakened Burgoyne by withdrawing almost a seventh of his effective force, and by causing the desertion of a large body of Indians and Canadians, while it greatly strengthened the Americans, particularly by causing the enlistment of large bodies of militia for service under General Gates. (See Saratoga, Battles of.) Consult: Tyler, *Bennington, the Battle* (Worcester, 1878); and Carrington, *Battles of the American Revolution* (New York, 1877).

BEN'NO, Saint (1010-1107). Bishop of Meissen. He was a son of the Count of Woldenberg, and became Bishop of Meissen in 1066. His vacillating policy during the conflict between the Emperor Henry VI. and Pope Gregory VII. led to his frequent imprisonment. He was deposed in 1085 by the Synod at Mainz, but was reinstated two years afterwards through the mediation of Pope Clement III., and thenceforth devoted himself solely to his clerical duties and to the conversion of the Wends. He was placed among the saints by Pope Adrian VI. in 1523. Luther attacked him in the writing entitled, *Wider den alten Teufel der zu Meissen soll erhoben werden*, and at the beginning of the Reformation his body was disinterred, but finally found a resting-place at Munich in 1576, which city had chosen Benno as its patron saint.

BENOIT, be-nwä', Pierre Léonard Léopold (1834-1901). A Flemish composer. He was born at Harlebeke, Belgium, and studied with Fétis at the Brussels Conservatory (1851-55), and afterwards at Leipzig, Dresden, Munich, and Berlin. In 1862 he conducted the orchestra at the Bouffes Parisiens, Paris, and in 1867 he received an appointment as director of the Conservatory at Antwerp. He was the most active promoter of a strictly national school of music for Belgium. His important compositions include *Het Dorp in't Gebergte*, comic opera (1856); *Isa*, opera (1867); *De Oorlog* (War), oratorio (1873); music to *Charlotte Corday*, a historical drama, by Ernest van der Ven (1876). He was also a voluminous and influential writer on musical subjects.

BENOIT DE SAINTE-MORE, be-nwä' de sănt' mōr', or **DE SAINTE-MAURE** (Twelfth Century). A French troubadour, born in the little village of Sainte-Maure, in Touraine. He was attached to the court of Henry II. of England (1154-89), and in 1160 composed, at the request of Queen Eleanor, the *Roman de Troie*, 2 vols. (Paris, 1869-71). His *Chronique des ducs de Normandie*, 3 vols. (1837-42), composed about 1180 (probably at the request of Henry II.), and consisting of about 45,000 octosyllabic verses, strongly eulogizes the Plantaganet dynasty. Benoit's other works include *Le Roman d'Enéas*, a continuation of the *Roman de Troie*.

BENOÎTON, be-nwä'tôn', La Famille (Fr., the Benoîton family). The title of a comedy by Sardou (1865). Madame Benoîton has become proverbial for a woman who neglects her home.

BENOUVILLE, be-noo͞'vēl', Jean Achille (1815-91). A French landscape painter. He was born in Paris, and was a pupil of Picot. He received the *Grand prix de Rome* in 1845 for his picture "Ulysses and Nausicaa." During his long residence in Rome he sent to the Paris art exhibitions several pictures, which were composed and executed with classic sentiment. He returned to Paris in 1867. Among his numerous paintings the following are especially noteworthy: "Etruscan Tombs at Sutri, near Velletri," "Saint Peter's," "Torre de Schiavi," "Tivoli," "Castel Fusano," "Pic du Midi" (1872, acquired by Mrs. A. T. Stewart, New York), "After the Bath" (1883), "Ford of Malavaux" (1885).

BENRATH, bĕn′rät, Karl (1845—). A German Protestant theologian. He was born in Düren, and studied at the universities of Bonn, Berlin, and Heidelberg. In 1871 he went to Italy, where for several years he devoted himself to scientific research. He has been professor at the universities of Bonn (1879) and Königsberg (1890). Among his theological writings, most of which are devoted to the history of the Reformation in Italy, the following are especially noteworthy: *Geschichte der Reformation in Venedig* (1887); *Bernardino Ochino von Siena* (1892); *Geschichte des Hauptvereins der Gustav-Adolf Stiftung für Ostpreussen* (1894). Benrath was one of the founders of the *Rivista cristiana.*

BENSERADE, bäɴ′s'-räd′, Isaac de (1612-91). A French poet, born at Lions-la-Forêt (Normandy). He wrote verses for the interludes performed at the French court, a translation of the *Metamorphoses* of Ovid, and some formal tragedies. He is best known, however, for a sonnet on Job, written to accompany his paraphrase of the Book of Job. This sonnet was declared by many to rival Voiture's *Uranie,* and for a time the court was divided into 'Jobelins' and 'Uranins.' Benserade's collected works appeared in 1697 (2 vols.). Uzenne prepared a new edition of the poems (1875).

BENS′LEY, Robert (?-c.1817). An English actor, chiefly remembered for his acting of the part of Malvolio, and for Charles Lamb's admiration of him. The facts of his history are very imperfectly recorded, though from 1765 till 1796 he was a well-known performer at the Drury Lane, Covent Garden, and Haymarket theatres. His first appearance, so far as known, was in *Venice Preserved;* his last was in *The Grecian Daughter,* in 1796. The closing years of his life appear to have been spent in the quiet enjoyment of an inherited fortune. Consult Lamb, *Essays of Elia* (London, 1853).

BEN′SON, Arthur Christopher (1862—). An English author. He was born April 24, 1862, the eldest son of Archbishop Benson of Canterbury, and brother of E. F. Benson (q.v.). He was educated at Eton and at King's College, Cambridge, taking first class in classics (1884), and he became master of Eton College in 1885, a position which he still holds. Among his prose works are *Memoirs of Arthur Hamilton* (1886), a novel; *Archbishop Laud* (1887); *A Biographical History of Eton* (1889); *Essays* (1896); *Life of Archbishop Benson* (1899). He published volumes of graceful verse in 1893, 1895, 1896, and 1900.

BENSON, Carl (1820-74). The pen name of Charles Astor Bristed. He published *Five Years in an English University,* and *The Upper Ten Thousand in New York.*

BENSON, Edward Frederic (1867—). An English author, and son of Edward White Benson, Archbishop of Canterbury. He was educated at King's College, Cambridge; published *Dodo* (1893); *Six Common Things* (1893); *Rubicon* (1894); *Limitations* (1896), and *The Babe, B.A.* (1897).

BENSON, Edward White, D.D. (1829-96). Archbishop of Canterbury. He was born near Birmingham, England, July 14, 1829. He was graduated at Cambridge in 1852, and entered holy orders. For some years he was a master at Rugby, and held the head mastership of Wellington College from its opening, 1858, until 1872, when he was appointed a chancellor of Lincoln Cathedral. In 1877 he was made the first Bishop of Truro, and on the death of Archbishop Tait (1882) was appointed his successor, being consecrated Archbishop of Canterbury, Primate of all England, March 29, 1883. He was one of the ablest in the long line of prelates. His publications were mostly sermons, charges, and contributions to periodicals; but he completed just before his sudden death at Hawarden, October 11, 1896, an elaborate and lifelong study on *Cyprian: His Life, Times, and Work* (London, 1897); and indicative of his fine spirit are *Prayers, Public and Private, Compiled, Written, or Translated* (1899). See his *Life* by his son, Arthur Christopher Benson (London, 1899, 2 vols.; abridged ed., 1901).

BENSON, Egbert (1746-1833). An American jurist and author. He was born in New York City, and in 1777 became a member of the first New York State Legislature. He served in Congress (1784-88, 1789-93, and 1813-15), and was judge of the State Supreme Court from 1794 to 1801, when he became judge of the United States Circuit Court. He was a regent of the University of New York (1789-92); first president of the New York Historical Society (1817-20); and the author of *A Vindication of the Captors of Major André* (1817) and a *Memoir on Dutch Names of Places* (1835).

BENT, James Theodore (1852-97). An English traveler and archæologist. He was born near Leeds, and studied at Wadham College, Oxford. He made archæological journeys to Greece, Asia Minor, Abyssinia, Arabia, the Bahrein Islands, and South Africa, chiefly under the direction of the Royal Geographical Society. In 1891 he went to Mashonaland to examine and partially to excavate the ruins of the Great Zimbabwe, discovered by Mauch in 1871. His interesting report on the results achieved assigns to the ruins an Arabian origin. In 1894 he explored a portion of the southeastern coast of Arabia. His works include *The Cyclades, or Life Among the Insular Greeks* (1885); *The Ruined Cities of Mashonaland* (1892); *The Sacred City of the Ethiopians* (1896). He also edited for the Hakluyt Society a volume on *Early Travels in the Levant.*

BENT, Silas (1820-89). An American naval officer who first delineated and described the Kuro Shiwo, the great equatorial and northward stream of the Pacific, which distributes the hot water of the tropics into northern regions. He was born in Saint Louis, Mo., October 10, 1820, and was a grandson of Captain Bent, the commander of "the Tea Party Regiment" that in 1773 threw the British tea overboard in Boston Harbor. He entered the United States Navy as midshipman in 1836, serving 25 years, during which time he made those researches in hydrography and meteorology which enabled him to add materially to the knowledge of storms, tornadoes, currents, rainfall, and the climate of what used to be called "the Great American Desert." He served in the Seminole War, voyaged in the South Pacific, and was especially active on survey work. He was on the brig *Preble*, under Commander Glynn, who, in February, 1849, at Nagasaki, Japan, procured the release of 18 American sailors, who had been kept prisoners. In this cruise he gained accurate information concerning the Japanese and how to deal with them, which was extremely valuable to Commodore M. C. Perry, under whom he served as captain and flag-lieutenant from 1852 to 1856. In this expedition he had charge of those hydrographic surveys which ultimately became the basis of the later work by the Japanese navy. He piloted the fleet into Napha, in the Riu-Kiu (Loo-choo) Islands, and was a commissioner for the United States in making a treaty with the Regent. In a lecture before the American Geographical Society, in December, 1855, he first described in scientific terms the Pacific Gulf Stream, 'the river in the ocean,' and its branches, the main part of which is called by the Japanese the Kuro Shiwo, or Black Tide. His numerous scientific studies greatly facilitated the progress of polar research and discovery.

BEN'TANG. See ERIODENDRON.

BENT GRASS (AS. *beonot*, found in composition only, OS. *binut;* OHG. *binuz*, Ger. *Binse, rush;* possibly OHG. *bi*, by + *naz*, Ger. *nass*, wet; literally: that which grows in wet places), *Agrostis.* A genus of grasses, the species of which are numerous, and are found in almost all countries and climates; several are natives of Great Britain. All of them are grasses of a slender and delicate appearance. Some are very useful as pasture grasses and for hay, on account of their adaptation to certain kinds of soil. The species *Agrostis alba, Agrostis vulgaris*, and *Agrostis stolonifera* are often separated, although the last two are little more than varieties of *Agrostis alba.* The common bent grass (*Agrostis vulgaris*) forms a principal part of the pasture in almost all the elevated districts of Great Britain, and is equally abundant in many parts of the Continent of Europe. It resists drought better than almost any other grass, but is only sown by agriculturists on soils unsuitable for the more luxuriant grasses. It is also regarded as very suitable for lawns. It is as frequent on wet as on dry soils, and varies much in size and appearance. The marsh bent grass (*Agrostis alba*), also very common in Great Britain, forming a large part of the natural pasture in many moist situations, is very similar to the species just described, but generally taller and stouter. A variety with somewhat broader leaves and a more luxuriant habit of growth was at one time much celebrated among agriculturists, under the name of fiorin grass, or creeping bent grass (*Agrostis stolonifera*). It is a useful grass in moist grounds, newly reclaimed bogs, or land liable to inundation. The first three or four joints of the culms lie flat on the damp soil, emitting roots in abundance, and it was formerly propagated by chopping these into pieces and scattering them, but now generally by seed. Brown bent grass (*Agrostis canina*), a common perennial British grass, abundant in moist heaths and moorish grounds, is valuable for mixing with other grasses to form permanent pasture on poor, wet, peaty soils. In the United States it is commonly known as Rhode Island bent grass, and is considered one of the best of lawn grasses. Silky bent grass (*Agrostis spica venti*) is a beautiful grass, with very slender branches to its ample panicle, which, as it waves in the wind, has a glossy and silky appearance. It is a rare native of sandy grounds in England, common in Southern and Central Europe; it is an annual grass, occasionally sown in spring to fill up blanks in grass fields.

BENTHAM, bĕn'tam *or* bĕn'tham, GEORGE (1800-84). An English botanist, a nephew of Jeremy Bentham (q.v.). He was born at Stoke, near Plymouth, and studied law at Lincoln's Inn until 1832, but afterwards devoted himself to botany. He was a great linguist, and is said to have fluently read the literature on botany in 14 languages. In 1861 he became president of the Linnæan Society, and held this position continuously for 13 years. His most important works are the following: *Labiatarum Genera et Species* (1832-36); *Handbook of the British Flora* (1858 and 1865); *Flora Hongkongensis* (1861); *Flora Australiensis* (in collaboration with Ferdinand von Müller, 5 vols., 1863-70); *Genera Plantarum ad Exemplaria Imprimis in Herbariis Kewensibus Servata Definata* (with Hooker, 1862 et seq.).

BENTHAM, JEREMY (1748-1832). An English jurist and philosopher. He was the son of a wealthy solicitor in London; received his early education at Westminster School; and when yet a boy, being little more than 12 years of age, went to Queen's College, Oxford, where he took his bachelor's degree in 1763, and his master's degree in 1766. Before entering it, he had already, by his precocious tendencies to speculation, acquired the title of 'the philosopher.' In 1763 his father, who expected his son to become Lord Chancellor, sent him to the study of the law at Lincoln's Inn; but soon afterwards he went back to Oxford, attracted by the fame of Blackstone's (q.v.) lectures. In 1767 he left Oxford to begin a legal career, but, much to the disappointment of his father, he had no relish for it, and took no pains to succeed in it. He studied chemistry and physics when he was expected to be working up cases. Turning from the practice of law to its theory, he became the greatest critic of legislation and government in his day. In 1776 he published *A Fragment on Government*, which was an acute criticism of some views contained in Blackstone's *Commentaries.* The *Fragment* abounds in fine, original, and just observation; it contains the germs of most of his after writings. It procured him the acquaintance of Lord Shelburne, in whose society at Bowood he afterwards passed perhaps the most agreeable hours of his life. It was in the Bowood society that he conceived an attachment for Miss Caroline Fox (Lord Holland's sister), to whom, years later, he offered his heart and hand, only to be rejected 'with all respect.' In 1778 he published *View of the Hard Labor Bill*, recommending an improvement in the mode of criminal punishment. His views on this subject were more fully expressed in a work written about this time, but not published in English till 1825, the *Rationale of Punishment and Rewards*. Bentham did more than any other writer of his time to rationalize the theory of punishments by consideration of their various kinds and effects, their true objects, and the conditions of their efficacy. He published in 1789 *Introduction to the Principles of Morals and Legislation*; in 1791, *The Panopticon, or the Inspection House*; *Manual of Political Economy* was written in 1793; *Poor Laws and Pauper Management* was published in 1797; *Introductory Views of the Rationale of Evidence* was printed in part in 1812. *The Rationale of Judicial Evidence* (edited by J. S. Mill, London, 1827) was another and a fuller presentation of the same subject. Many works of various dates bear upon the subject of codification of the laws. His *Constitutional Code*, one of his most important works, was published in full in 1841, under the editorial supervision of R. Doane. The subject of logic also interested Bentham, and he wrote a treatise on it. *Deontology, or the Science of Morality*, was edited and published by Bowring in 1834. His works were collected and edited by Bowring, and published with life and correspondence in 11 volumes (Edinburgh, 1843). A great mass of unpublished manuscript from Bentham's pen is to be found in the library of University College, London. Much of what came to light in Bentham's lifetime was edited by his friends, and some of it appeared first in French under the supervision of Dumont. Bentham had a habit of writing on various subjects at the same time; the result was an aggregation of manuscripts that required sifting, and he was fortunate in finding men of ability like Dumont to undertake this work. In his early works Bentham's style was clear, free, spirited, and often eloquent; but in his later works it became difficult, through being overloaded and darkened with technical terms. In regard to these latter works more especially M. Dumont has most materially served his master by arranging and translating them into French, through the medium of which language Bentham's doctrines were propagated throughout Europe, till they became more popular abroad than at home. James Mill, himself an independent thinker, did much in his writings to extend the application in new directions of Bentham's principles, a work in which, apart from his original efforts, he has achieved a lasting monument of his own subtlety and vigor of mind. But the most valuable contribution in English to Bentham's reputation is perhaps *Benthamiana*, by John Hill Burton (Edinburgh, 1843), containing a memoir, selections of the leading and important passages from his various writings, and an appendix embracing an essay on his system and a brief, clear view of all his leading doctrines.

In all Bentham's ethical and political writings the doctrine of utility is the leading and pervading principle, and his favorite vehicle for its expression in the phrase "the greatest happiness of the greatest number," which Bentham attributed to Priestley (q.v.), but which really dates back to Hutcheson's (q.v.) *Enquiry Concerning the Original of Our Ideas of Virtues or Moral Good*, which appeared in 1725. "In this phrase," Bentham says, "I saw delineated for the first time a plain as well as a true standard for whatever is right or wrong, useful, useless, or mischievous in human conduct, whether in the field of morals or of politics." It need scarcely be remarked that the phrase affords no guidance as to how the benevolent end is to be attained, and is no more than a quasi-concrete expression of the objects of true benevolence. In considering how to compass these objects, Bentham arrived at various conclusions, which he advocated irrespective of the conditions of society in his day. He demanded nothing less than the immediate remodeling of the government, and the codification and reconstruction of the laws; and insisted, among other changes, on those which came at a later day to be popularly demanded as the points of the 'charter'—viz., universal suffrage, annual parliaments, vote by ballot, and paid representatives. However impossible some of these schemes then were, it cannot be denied that Bentham did more to rouse the spirit of modern reform and improvement in laws and politics than any other writer of his day. Many of his ideals have been and many more are in the course of being slowly realized. The end and object of them all was the general welfare, and his chief error—apart from his overestimate of the value of some changes which he proposed—lay in conceiving that organic changes are possible through any other process than that of growth and modification of the popular wants and sentiments. It was this error that led the philosopher, in his closet in London, to devise codes of laws for Russia (through which country he made a tour in 1785), America, and India, the adoption of which would have been equivalent to revolutions in those countries, and then bitterly to bewail the folly of mankind when his schemes were rejected. In ethics, as in politics, he pressed his doctrines to extremes. See UTILITARIANISM; HEDONISM.

By the death of his father in 1792 Bentham succeeded to property in London and to farms in Essex, yielding from £500 to £600 a year. By a life of temperance and industry, with great self-complacency, in the society of a few devoted friends, Bentham attained to the age of 84. Consult: C. B. R. Kent, *The English Radicals* (London, 1899); W. Graham, *English Political Philosophy, from Hobbes to Maine* (London, 1899); J. S. Mill, "Bentham," in *London and Westminster Review* (August, 1838); L. Stephen, *English Utilitarians* (London and New York, 1900); Albee, *History of English Utilitarianism* (London, 1902).

BEN'THOS (Gk. *βενθος*, *benthos*, the depth of the sea). In botany, the fixed vegetation of the sea or of great lakes, in contrast with the floating vegetation or plankton (q.v.). Benthonic plants are in large part attached to rocks, in which case they are called lithophytes. The lithophytic members of the benthos are chiefly algæ, and it is here that the wonderful display of marine plants of our ocean coasts is found. The benthos may be subdivided into the regions above and below the low-tide line. Above this line the vegetation is relatively sparse, and is composed of plants which are able to endure strong exposure during the period of low tide. Along the North Atlantic coast, the rockweed (*Fucus*) is one of the most characteristic plants of this zone.

Below low tide is the zone of constant submergence, and here the benthos finds its richest development. Red, brown, and green algæ, and sometimes other plants, grow in vast profusion. In the upper parts of this zone the brown and green algæ often dominate, while red algæ dominate at greater depths. Deeper in the water all of these large plants cease.

The ecology of the benthos has been studied by Berthold and Kjellman. In the Mediterranean there are seasons which are determined by light, surface forms vegetating early in the year, while the algæ of deeper waters vegetate in summer. One of the surprises of the northern seas is the rich development of plant life, the brown algæ being particularly common. Here the seasons depend rather upon heat than light. Most of the benthonic lithophytes have well-developed holdfast organs ('haptera') attaching them to rocks, and many forms are provided with bladders which permit free floating in the water.

Less conspicuous than the rock plants are the plants attached to loose soil. A few algæ like Caulerpa are classed here, but perhaps the most prominent plant of this group is the eel-grass (*Zostera*), which often forms vast submarine meadows. The benthos of fresh waters is not well developed, or, if present, has a different ecology. See HYDROPHYTES; ECOLOGY.

BEN'TINCK, Lord WILLIAM CAVENDISH (1774-1839). A British army officer and Governor-General of India. He was born September 14, 1774, the second son of the third Duke of Portland, and became an ensign in the Coldstream Guards in 1791. Having served with distinction in Flanders, Italy, and Egypt, he was, in 1803, appointed Governor of Madras, where he advocated several useful reforms. His proscription of beards and the wearing of turbans and earrings by the sepoys when on duty was said to have caused the mutiny and massacre at Vellore, and he was recalled. In August, 1808, he was placed on the staff of the army in Portugal under Sir Harry Burrard. Selected to proceed on an important mission to the supreme Junta of Spain, he accompanied the army under Sir John Moore in its retreat, and at Corunna commanded a brigade. He next commanded a division of Wellington's army, and shortly after was sent as British Minister to the Court of Sicily, and commander-in-chief of the British forces in that island. At the head of an expedition, he landed in Catalonia in July, 1813, penetrated to Valencia, and afterwards laid siege to Tarragona, but was repulsed at Villa Franca. Early in 1814, quitting Sicily, he repaired to Tuscany, published at Florence a proclamation inviting the Italians to shake off the French yoke, and afterwards made himself master of Genoa. At the end of the war he lived in retirement during thirteen years. In 1827 he was appointed Governor-General of India, where, profiting by his prior experience, he pursued a peaceful and popular policy, his administration being especially marked by the abolition of suttee (q.v.), and by the opening up of internal communications, as well as by the establishment of the overland route. After his return to England, in 1835, he was elected a member of Parliament for Glasgow. He died in Paris, June 17, 1839. Consult Boulger, *Lord William Cavendish Bentinck* (Oxford, 1892).

BENTINCK, Lord WILLIAM GEORGE FREDERICK CAVENDISH (1802-48). An English statesman and sportsman, widely known as Lord George Bentinck. The third son of the fourth Duke of Portland, he was born at Welbeck Abbey, February 27, 1802, and entered the army when young. For three years after Canning became Premier, Lord George was his private secretary. He was distinguished for his skill in every sport, and became famous for the purification that ensued in the corrupt practices of the turf, through the reforms that he instituted. In 1826 he was elected member of Parliament for Lynn-Regis, and sat for that borough till his death. At first, attached to no party, he voted for Catholic emancipation and for the principle of the Reform Bill. A determined opponent of Sir Robert Peel, on the formation of that statesman's Ministry in December, 1834, he and his friend Lord Stanley, afterwards Earl of Derby, with some adherents, formed a separate section in the House of Commons. On the resignation of Sir Robert Peel in April following, Lord George openly joined the great Conservative Party, which acknowledged that statesman as its head, and he adhered to it for nearly eleven years. When Peel introduced his free-trade measures in 1845 a large portion of his supporters seceded, and Lord George became the leader of the Protectionists. Although a poor speaker, he was a master of figures and detail. His acute logic was damaging to the Government of Sir Robert Peel, and contributed in no small degree to hasten its downfall. A champion of religious liberty, Lord George supported the bill for the removal of the Jewish disabilities, and recommended the payment of the Roman Catholic clergy by the landowners of Ireland. He died suddenly from rupture of the heart, September 21, 1848, while crossing the park at Welbeck Abbey. Consult B. Disraeli, *Lord George Bentinck: A Political Biography* (London, 1851).

BENTIVOGLIO, bĕn'tē-vō'lyō, GIOVANNI (c.1438-1508). An Italian ruler, born at Bologna. He usurped the control of the Republic of Bologna, which he held from 1462 to 1506. Like many of the despots of the time, he was cruel, but a patron of the fine arts.

BENTIVOGLIO, GUIDO (1579-1644). An Italian prelate and historian, born at Ferrara. He studied at Padua, and became papal nuncio to Flanders, and later to France. In 1621 he attained the dignity of cardinal, and in 1641 was appointed to the bishopric of Terracina. He was expected to succeed Urban VIII. as Pope, but died before the election was held. He wrote *Della guerra di Fiandria* (1632-39) and other works.

BENT'LEY, RICHARD (1662-1742). An English critic and scholar. He was born at Oulton, in Yorkshire, January 27, 1662. In 1676 he entered Saint John's College, Cambridge, in the humble capacity of subsizar. Little is known of his university career, except that he showed early a strong taste for the cultivation of ancient learning. At the usual time, he took the degree of bachelor of arts, and on leaving the university he was appointed head master of the grammar school of Spalding, Lincolnshire. About a year afterwards he resigned this situation to become tutor to the son of Dr. Stillingfleet, then dean of Saint Paul's, and subsequently Bishop of Worcester. Bentley accompanied his pupil to Oxford, where he had full scope for the cultivation of classical studies; and that he succeeded in acquiring there some local reputation is evinced by his having been twice appointed to deliver the Boyle Lectures (q.v.) on the evidences of natural and revealed religion. He entered the Church, and owed to the patronage of the Bishop of Worcester various good ecclesiastical appointments, and through the same influence became librarian of the Royal Library at Saint James's. In 1690 he published his *Dissertation upon the Epistles of Phalaris*, which established his reputation throughout Europe, and may be said to have commenced a new era in scholarship. The principles of historical criticism were then little known, and their application to establish that the so-called Epistles of Phalaris, which professed to have been written in the Sixth Century B.C., were the forgery of a period some eight centuries later, created a considerable stir in the learned world.

In 1700 Bentley was appointed master of Trinity College, Cambridge; and in the following year he married Mrs. Joanna Bernard, the daughter of a Huntingdonshire knight. The history of Bentley's mastership of Trinity is the narrative of an unbroken series of quarrels and litigations, provoked by his arrogance and rapacity, for which, it must be confessed, he was fully as well known during his lifetime as for his learning. He contrived, nevertheless, to get himself appointed regius professor of divinity, and, by his boldness and perseverance, managed to pass scathless through all his controversies. Notwithstanding that at one time the Bishop of Ely, the visitor of Trinity, pronounced sentence depriving him of his mastership, and that at another the senate of the university pronounced a similar sentence depriving him of his academic honors, he remained in full possession of both the former and the latter till the day of his death. This stormy life did not impair his literary activity. He edited various classics—among others, the works of Horace—upon which he bestowed vast labor. He is, however, as much celebrated for what he proposed as for what he actually performed. The proposal to print an edition of the Greek New Testament, in which the received text should be corrected by a careful comparison with all the existing MSS., was then singularly bold, and evoked violent opposition. He failed in carrying out his proposal; but the principles of criticism which he maintained have since been triumphantly established, and have led to important results in other hands. He also called attention to the value of the digamma in the metrical study of Homer. He is to be regarded as the founder of that school of classical criticism of which Porson afterwards exhibited the chief excellences, as well as the chief defects; and which, though it was itself prevented by too strict attention to minute verbal detail from ever achieving much, yet diligently collected many of the facts which men of wider views have since grouped together, to form the modern science of comparative philology. Bentley died in 1742, leaving behind him one son, Richard, who inherited much of his father's taste, with, however, none of his energy, and several daughters, one of whom, Joanna, married, and was the mother of Richard Cumberland, the dramatist. Consult: Monk, *Life of Richard Bentley* (London, 1833); and Jebb, *Bentley*, English Men of Letters Series (New York, 1882).

BENTLEY, Robert (1821-93). An English botanist; born at Hitchin (Hereford). He studied medicine and botany at London University, and was professor at King's College and the London Institution. He was also associate editor of the *Pharmaceutical Journal*, and collaborator on the English edition of Pereira's *Materia Medica and Therapeutics* (1854-55). His principal works are the following: *A Manual of Botany* (1861; frequently republished); *Principal Plants Employed in Medicine* (1875 et seq.; profusely illustrated); *The Student's Guide to Structural, Morphological, and Physiological Botany* (1883); *A Text-book of Organic Materia Medica*.

BEN'TON, Angelo Ames (1837—). An American clergyman, born at Canea, Crete. He graduated at Trinity College, Hartford, Conn., and at the General Theological Seminary, New York. He was professor of dogmatic theology at the University of the South (1887-94), and has published *The Church Cyclopædia* (1884) and the *Tome of Saint Leo* (1890).

BENTON, James Gilchrist (1820-81). An American soldier and inventor. He was born at Lebanon, N. H., and was graduated at West Point in 1842. He was commandant of the Charleston (S. C.) arsenal in 1853, and for several years was instructor in ordnance and gunnery at West Point, where he perfected a wrought-iron gun-carriage for seacoast service—the first of its kind constructed in America. This carriage was immediately adopted by the Federal Government. Upon the outbreak of the Civil War, Benton was transferred to the Ordnance Department at Washington, and in 1863 was placed in command of the Washington arsenal. In 1866 he was transferred to the national armory at Springfield, Mass., where he remained as commandant until his death. Colonel Benton was the first to determine the velocity of projectiles by the use of electricity. The successive improvements in the Springfield rifle were also mainly due to his inventive skill. Among his other inventions were improved calipers for inspecting shells, a velocimeter, a spring dynamometer, an electro-ballistic pendulum, a cap-filling machine, and a reinforcing cap for cartridge-cases. He published *A Course of Instruction in Ordnance and Gunnery* (1873).

BENTON, Thomas Hart (1782-1858). An American statesman of the Jacksonian epoch. He was born, of good family, near Hillsborough, N. C., and on the death of his father, his mother, a woman of character and of ambition for her son, took the boy to Tennessee. Here he studied law and was soon elected to the Legislature, where he did work as a reformer. Andrew Jackson became his friend, but in 1813 they had a remarkable encounter, Jackson getting a ball in his shoulder from Benton's brother, and Benton being thrown down-stairs. Jackson and Benton were reconciled many years later. In the War of 1812 he was given a lieutenant-coloneley, but did not serve effectively. Shortly after the secession agitation of the Hartford Convention, Benton became a pronounced Union man, and he held to this position. In 1815 Benton settled in Saint Louis, and established the *Missouri Inquirer*, a journal that occasioned for him a number of duels, in one of which he killed his opponent. He advocated the admission of Missouri as a slave State, and after the famous compromise in 1820 was chosen United States Senator. He was regularly reëlected, so that he was Senator for thirty successive years. One of his long-prosecuted plans was to amend the Constitution so that the people could vote directly for President, or come as near as possible to such a system. This project he brought forward several times, but it never came near adoption, all friends of caucus nominations and secret machine work in politics naturally opposing it. One of his hardest fights was in opposition to the rechartering of the United States Bank. He advocated instead the establishment of a currency of gold and silver only, for which idea he was long called 'Old Bullion.' After Jackson's removal of Secretary Duane in the fight against the Bank, the Senate adopted a resolution censuring the President; but Benton, who in many ways was Jackson's lieutenant, not long after moved to expunge that resolution from the record, and carried his point after a long and fierce contest. Among other measures advocated by Benton were the preëmption of public lands, a railroad to the Pacific, the abolition of the salt tax, and opening mineral lands to settlement. In other words, he was a strong supporter of Western interests. In the Orĕgon boundary dispute with Great Britain he took a leading part against the 'fifty-four-forty or fight' advocates, and his influence greatly conduced to the retreat of Polk's administration from an extreme position. He was of service to Polk during the Mexican War, and it was actually proposed at one time to put him in command of the forces in the field. He opposed Calhoun's pro-slavery propaganda and the compromise measures of Henry Clay in 1850. As a result of his hostility to Calhoun and the pro-slavery Democrats he lost his senatorship. Two years after his long service in the Senate ended, he was chosen to the other House, where he opposed the Kansas-Nebraska bill and failed of reëlection on that account. In 1856 he was a candidate for Governor of Missouri, but lost through the presence of a third ticket in the field. At the same election he supported Buchanan for President, although his son-in-law, Frémont, was the opposing candidate. He was a vigorous and telling speaker, and of great influence throughout his long senatorial career. He possessed considerable learning, but did not always escape in using it the disadvantages incident to his lack of early training. As a representative of the West during the ante-bellum period he is of great importance to the student of American history. His *Thirty Years' View* (1856) is a well-known and valuable political retrospect of his experiences and observations in the Senate. He also made a notable *Abridgment of the Debates in Congress from 1789 to 1850*, in 15 large volumes (1857). Consult Roosevelt, *Thomas Hart Benton* (Boston, 1887).

BENTON GROUP. See CRETACEOUS SYSTEM.

BENTON HAR′BOR. A city in Berrien County, Mich., 60 miles east of Chicago, Ill.; on the Saint Joseph River, and on the Père Marquette, the Cleveland, Cincinnati, Chicago and Saint Louis, and other railroads (Map: Michigan, G 6). It is 1½ miles from Lake Michigan, with which it is connected by a ship-canal, has a good harbor on the lake, with steamboat lines to Chicago and Milwaukee, and exports large quantities of fruit, besides grain and lumber. The manufactures include fruit packages, vinegar, cider, pickles, beet-sugar, furniture, flour, planed lumber, machinery, etc. In the city and the vicinity are mineral springs possessing valuable medicinal properties, which make the locality popular as a place of resort. The bottled water is shipped in considerable quantities. Population, in 1890, 3692; in 1900, 6562.

BEN′TONVILLE. A village in Johnston County, North Carolina, where, on March 19, 1865, a Confederate force of about 15,000, under Johnston, vigorously attacked the left wing of Sherman's army, under General Slocum, but was repulsed, with the aid of Kilpatrick's cavalry, after several hours of stubborn fighting. Substantial Federal reinforcements from the main army having arrived during the day, Johnston did not renew the attack, and on the night of the 21st hastily retreated toward Raleigh, while Sherman proceeded to Goldsboro to effect a junction with Schofield. The Federal loss in killed, wounded, and missing was about 1600, the Confederate about 2700. Consult Johnson and Buel, *The Battles and Leaders of the Civil War*, Vol. IV. (New York, 1887).

BENTONVILLE. A town and the county-seat of Benton County, Arkansas, about 85 miles north of Fort Smith; on the Arkansas and Oklahoma Railroad, a branch of the Saint Louis and San Francisco system (Map: Arkansas, A 1). It contains Ouachita, a Baptist academy, and Bentonville College. The town is the centre of a productive fruit-growing and agricultural region, with a considerable trade in fruit, tobacco, grain, and live stock; and has extensive fruit evaporating and fruit brandy distilling interests, cold storage plant, etc. Population, in 1890, 1677; in 1900, 1843.

BENTZEL-STERNAU, bĕn′tsel stĕr′nou, KARL CHRISTIAN ERNST, Count (1767-1849). A German statesman and author, born at Mainz. He was successively Minister of the Interior of the Grand Duchy of Baden (1808), president of the Supreme Court of Mannheim (1810), and Minister of State and Finance of the Grand Duchy of Frankfort (1812). He became famous as a humorist and close student of human nature through his novel, *Das goldene Kalb*, in which he follows in the footsteps of Jean Paul. This was followed by *Der steinerne Gast* (1808); *Pigmäenbriefe* (1808); and *Der alte Adam* (1819-20). The dramatic works of the author were less successful, while his *Bayernbriefe* were characterized by political insight and patriotism.

BENTZON, bäɴ′tsôɴ′, TH. The pseudonym of Marie Thérèse Blanc (1840—). A French journalist and novelist, for many years on the staff of the *Revue des Deux Mondes*. She was born at Seine-Port, has traveled widely in the United States, and written wisely of American literature and social conditions. Among her essays are *Littérature et mœurs étrangères* (1822) and *Les nouveaux romanciers américains* (1885). Her novels include: *La vocation de Louise* (1873); *Sangmêlé* (1875); *Un remords* (1878); *Yette, histoire d'une jeune Créole* (1880; 1882); *Yvonne* (1881); *Tony* (1884); *Contes de tous les pays* (1890); *Jacqueline* (1893). She also wrote *Nouvelle France et nou-*

velle Angleterre: Notes de Voyage (1899). Mme. Bentzon has also translated several works by Dickens, Bret Harte, Ouida, Aldrich, and other English and American novelists.

BENUE, bĕn′wē, or **BINUE.** An important river of West Central Africa, and the largest tributary of the Niger (Map: Africa, E 4). It rises in southern Adamawa, in about latitude 7° 30′ N., and longitude 13° 45′ E. It flows generally westward, and after a course of about 900 miles, joins the Niger 300 miles from the coast, in about latitude 8° N. Its width in its lower course varies from about 1600 to 3200 feet, and its navigable length exceeds 600 miles during the wet season; but during the dry season, January to May, it is very shallow. Its chief tributaries are the Majo Kebbi, Gongola, Kadera, Tarabba, and Faro. The Benue River was known to Europeans as early as 1831, and was then supposed to be connected with Lake Chad. In 1851 it was partially explored by Barth, who made an investigation of its upper stream and exploded the theory of its being connected with Lake Chad. In 1854 another expedition under Baikie explored the river as far as Dulti, about 350 miles above its confluence with the Niger. In 1879 the explorer Robert Flegel journeyed along the Benue through its entire navigable length and explored some of its tributaries. The expedition of Mizon, in 1892, made our knowledge of the river very complete. By an agreement between Germany and Great Britain the freedom of navigation on the Benue has been guaranteed.

BENVO′LIO. A character in Shakespeare's *Romeo and Juliet*, a friend of Romeo. Mercutio describes him aptly in Act iii., Scene 1.

BEN′WELL AND FEN′HAM. A municipality in Northumberland, England, on the Tyne, 2½ miles west of Newcastle. Coal-mining is the leading industry. Population, in 1891, 10,500; in 1901, 18,350.

BENZAL′DEHYDE. See ALMONDS, VOLATILE OIL OF.

BENZAYDA, bĕn-zäī′dȧ. The heroic daughter of the Sultan in Dryden's *The Conquest of Granada*. She loves the son of her father's mortal enemy, and follows him through all the horrors of the war.

BEN′ZENE, or **BEN′ZOL** (for derivation see BENZOIN), C_6H_6. One of the most important of the compounds of carbon. Large quantities of it are industrially converted into nitro-benzene, from which, in turn, all of the aniline of commerce is manufactured. The luminosity of a coal-gas flame is largely due to the presence of considerable quantities of benzene in the gas. Besides, benzene is an excellent solvent for fats, resins, iodine, and other substances, and is much used for cleaning purposes. The importance of benzene in pure chemistry is due to the fact that a very large number of substances are derived from it, the derivatives constituting the so-called *aromatic compounds.* Benzene may be obtained in a variety of ways; it is produced by passing the vapors of ordinary alcohol, ether, and many other organic substances through a tube heated to redness; it is one of the constituents of the tar obtained by heating wood, peat, and shale out of contact with air, etc. Faraday first discovered it (1825) in oil-gas, and in 1845 Hofmann found it in coal-tar, from which all the benzene of commerce is at present obtained. The process by which benzene is obtained industrially was first worked out by a pupil of Hofmann's, Charles Mansfield, whose death was caused (1856) by a large quantity of benzene taking fire during a distillation. Most of the benzene produced by the destructive distillation of coal forms a constituent of illuminating gas, while the remaining benzene is found in the portion of the coal-tar that distils over below 170° C. When this portion, called *light oil*, is redistilled, a liquid consisting mainly of benzene and a similar substance called toluene passes over between 82° and 110° C. This portion is purified by washing consecutively with sulphuric acid, water, and soda; it is then subjected to further fractional distillation. In this manner still somewhat impure benzene is obtained. To purify it, the liquid is cooled to crystallization, and the benzene crystals are separated and again distilled. Thus benzene is rendered pure enough for all practical purposes. It still contains, however, a small quantity of the compound called *thiophene* (C_4H_4S), whose presence may be best demonstrated by the so-called indophenin reaction, causing a blue coloration to appear when a little sulphuric acid and isatin are added to ordinary benzene. As thiophene is more readily soluble in sulphuric acid than benzene, it may be eliminated from the latter by repeatedly agitating with the concentrated acid at the ordinary temperature. A better method, however, consists in boiling benzene for about half an hour with some aluminium chloride, and then distilling. In this manner perfectly pure benzene may be prepared for scientific purposes. Pure benzene is a light, colorless liquid, having a peculiar odor and a burning taste. At low temperatures it solidifies, forming colorless crystals that melt at 6° C., and boil at 80.5° C. The vapors burn with a smoky flame, owing mainly to the high percentage of carbon contained in benzene. Benzene floats on water, but mixes readily with ether, anhydrous alcohol, petroleum, and many other organic liquids. When treated with strong nitric acid, it is converted into nitro-benzene, according to the following equation:

$$\underset{\text{Benzene}}{C_6H_6} + \underset{\text{Nitric Acid}}{HNO_3} = \underset{\text{Nitro-benzene}}{C_6H_5NO_2} + \underset{\text{Water}}{H_2O}$$

The French chemist Berthelot succeeded in converting acetylene gas into benzene by heating the former at a dull-red heat, the conversion taking place according to the following simple chemical equation:

$$\underset{\text{Acetylene}}{3C_2H_2} = \underset{\text{Benzene}}{C_6H_6}$$

As acetylene (q.v.) can be made directly from carbon and hydrogen, it may be said that benzene, too, can be made from its elements. For an account of the chemical constitution of benzene and its derivatives, see CARBON COMPOUNDS.

BENZER′TA. See BIZERTA.

BEN′ZIDINE, $H_2N.C_6H_4.C_6H_4.NH_2$. A valuable organic substance derived from benzene. In the pure state, it forms crystals that melt at 122° C. Benzidine and its derivatives are now used in making many beautiful coloring substances, including the well-known *Congo red* and the *benzopurpurins.* The dyes have the remarkable property of combining with cotton without the aid of mordants, and are at present manufactured in very large quantities.

BEN'ZINE (for derivation see Benzoin). One of the products of the fractional distillation of crude petroleum. It is a mixture of volatile hydrocarbons of the marsh-gas series, containing chiefly hydrocarbons that are represented by the two formulæ, C_6H_{14} and C_7H_{16}. It is often used as a cleaning fluid for household purposes, as well as for removing ink from printing-presses. It is a very good solvent for fats, gums, and resin, and is employed in making many varnishes. It also finds employment for enriching coal-gas, and for certain other purposes. At ordinary temperatures it is a limpid, colorless liquid, much lighter than water, with which it does not mix, and readily catching fire. It boils between the temperatures of 70° and 90° C. (158° and 194° F.), its vapor forming with air a highly explosive mixture. It should not be confounded with the much more important substance called *benzene* (q.v.) that is obtained as a product of the fractional distillation of coal-tar. See also Petroleum.

BENZO'IC AC'ID (for derivation see Benzoin), C_6H_5COOH. An organic substance used in medicine and the arts, and largely for scientific purposes. It may be manufactured by one of the following three methods: (1) From benzoin, by subliming or boiling the gum with caustic soda solution. (2) From the urine of herbivorous animals, by evaporating to a small bulk, filtering and adding hydrochloric acid to acid reaction; on standing, crystals of hippuric acid separate out; these crystals are transformed into benzoic acid by boiling with strong hydrochloric acid, the hydrochloride of amido-acetic acid (glycine) being formed at the same time, according to the following equation:

$$\underset{\text{Hippuric Acid}}{C_6H_5CONHCH_2COOH} + \underset{\text{Hydrochloric Acid}}{HCl} + \underset{\text{Water}}{H_2O} =$$

$$\underset{\text{Benzoic Acid}}{C_6H_5COOH} + \underset{\text{Hydrochloride of Glycine}}{CH_2(NH_2)COOH.HCl}$$

Finally, (3) benzoic acid may be made from benzyl chloride by oxidizing the latter with nitric acid, the transformation taking place according to the following chemical equation:

$$\underset{\text{Benzyl Chloride}}{C_6H_5CH_2Cl} + 2O = \underset{\text{Benzoic Acid}}{C_6H_5COOH} + \underset{\text{Hydrochloric Acid}}{HCl}$$

The crude benzoic acid obtained by one of these methods may be purified by recrystallization from water. The pure acid melts at 120° C. and boils at 250° C. It readily sublimes, however, long before melting. Though but sparingly soluble in cold water, it dissolves readily in hot water, as well as in alcohol, ether, and other organic liquids.

The acid employed for medicinal purposes is obtained exclusively by subliming gum benzoin, and retains the balsamic odor of the gum. When introduced into the body, it is converted (probably in the kidneys) into hippuric acid, which appears in the urine, of course increasing its acidity. For this reason, benzoic acid, or its salts, are administered whenever the urine undergoes alkaline decomposition—for instance, in cystitis and pyelitis. Benzoic acid is also used as a disinfecting expectorant in phthisis and bronchitis, when the expectoration is foul.

In the arts, benzoic acid is employed in making the dyes known as aniline blue, anthracene brown, etc.

Among the *benzoates*, or salts of benzoic acid, may be mentioned the benzoate of ammonium and the benzoate of sodium, both of which are used in medicine. They are prepared by adding benzoic acid, respectively, to solutions of ammonia and of sodium carbonate. These benzoates are much more readily soluble in cold water than the free acid.

Benzoic acid has been known since the beginning of the Seventeenth Century. In 1824 Wöhler discovered the relationship between benzoic and hippuric acids, and in 1832 Liebig and Wöhler determined the true chemical composition of benzoic acid and established its relation to the other benzoyl compounds.

BENZOIN (bĕn-zoin') **GUM**, or Gum Benjamin (earlier *benjoin*, Fr. *benjoin*, Ger. *Benzoe*, Sp. *benjui*, from Ar. *lubān-jāwa*, incense of Java, which is the Arabic name for Sumatra, as the syllable *lu* was lost through mistaking it for the Arabic definite article *al*, *el*). A fragrant resinous substance, the dry juice of a large tree, *Styrax benzoin*, a native of Sumatra and Java. The tree was introduced into Siam and other places in the East, and the finest gum to be found in the market comes from Siam. Gum benzoin yields a pleasant odor when burned, and is used as incense in the Roman and Greek churches; very large quantities of it are used for a similar purpose in the East. It is used, to some extent, in perfumery, and is sometimes administered medicinally, owing to its properties as a stimulant and emetic; as a good antiseptic it is one of the ingredients of court plaster. Druggists sometimes add a little benzoin to pomade, to prevent the fat of the latter from becoming rancid. A little of the tincture of gum benzoin added to washes imparts to them a milk-white color and an odor resembling that of vanilla. Benzoin comes to us in reddish-yellow transparent pieces. It is obtained by making longitudinal or oblique incisions in the stem of the tree, the liquid which exudes soon hardening by exposure to the sun and air. Different products, the quality of which depends mainly on the age of the trees from which they are obtained, differ considerably in price. The gum yielded by trees from 5 to 8 years old is supposed to be of the finest quality; it is almost white, and possesses a particularly strong odor. The gum of trees 16 to 18 years old is almost worthless. Chemically, gum benzoin is a mixture of three different resinous substances soluble in alcohol and alkalies; it contains, besides, a considerable quantity of benzoic acid, and often some cinnamic acid.

BENZOIN O'DORIF'ERUM. See Fever-Bush.

BEN'ZOL. See Benzene.

BENZOYL, bĕn'zoil, C_6H_5CO. An organic radical, i.e. a group of atoms that forms part of the molecules of many compounds, but that cannot exist independently.

BEOTHUK, bā'ō-thuk. A mysterious tribe formerly inhabiting the interior of Newfoundland. The name is of Micmac origin, and is said to signify 'red people,' in allusion to their custom of painting their bodies with red ochre.

They were called 'Red Indians' by the white settlers. They lived in very large tepees covered with bark or skins, and built a peculiar crescent-shaped canoe. Owing to their implacable hostility to the whites, they were hunted down like wild beasts until about 1820, when a handful of survivors crossed the straits and found a hiding-place in the frozen wilds of Labrador, where some of their descendants may still exist. From an investigation of the few words of their language that have been preserved, Gatschet comes to the conclusion that they constituted a distinct stock.

BEÖTHY, bā′ē-tĭ, ZOLTÁN (1848—). An Hungarian novelist and writer on æsthetics. He was born in Komorn, September 4, 1848, and has been since 1882 professor of æsthetics in the University of Budapest. His novels, praised for their realistic treatment and clever analysis of character, include: *Beszélyek* (1871); *A névtelenek: Kálózdi Béla* (1875); *Rajzok* (sketches, 1879). A collection of his critical and dramatic essays appeared in Budapest in 1882. He is also author of a history of Hungarian literature, an important work upon tragedy (*A tragikum*, 1885), and a history of Hungarian prose fiction (1886).

BEOWULF, bā′ō-wụlf. An Old English poem, epic in theme and in tone, and one of the most interesting literary monuments of the Germanic race. The unique MS. of the poem, now in the British Museum, is usually assigned to the Tenth Century. But the composition of the poem, in its present form, is placed as early as the Eighth Century. The poem also contains mythological elements of still greater antiquity. The scene is Denmark, apparently Zealand, and the opposite coast of Sweden. The monster Grendel — half man, half fiend — comes every night from the fens into the splendid hall of Hrothgar, King of the Danes, and carries off to his subterranean dwelling a number of the King's thegns and devours them. Beowulf, a prince among the Geats (of south Sweden), hearing of this, crosses the sea with fourteen companions to rid Hrothgar of the sea fiend. In a mighty struggle in the hall at night Beowulf performs his exploit; Grendel, after having an arm wrenched from the socket, flees to the fens to die. The next night Grendel's mother comes to the hall to avenge the death of her son, and bears away one of Hrothgar's counselors. Beowulf, who is absent, is sent for in the morning. He descends to the caves of the sea and slays the water demon with a sword wrought by the giants. Beowulf returns to his country, where he becomes King and rules for fifty years. Then a dragon, having been robbed of a cup from an immense hoard which he had guarded for three hundred years, becomes enraged and devastates the land. Beowulf, though weakened by his great age, puts the dragon to death with the aid of a kinsman. But, severely wounded, he dies after viewing the treasures. Besides these three adventures, there are several episodes, and throughout graphic scenes of the social life of our ancestors before they left their ancient homes for Britain.

BIBLIOGRAPHY. The literature on *Beowulf* is immense. For an account of the poem, with bibliographies of editions and dissertations and other articles upon it, consult: Morley, *English Writers*, Vol. I. (London, 1887); *Beowulf*, translated by Garnett (Boston, 1885); Ten Brink, *Early English Literature*, translated by Kennedy (New York, 1883); *Beowulf*, translated into English prose by C. B. Tinker (New York, 1902). For text, a facsimile of the MS., with transliteration and notes by Zupitza, made for the Early English Text Society (London, 1882). For editions of *Beowulf* consult: Thorpe (London, 1875); Arnold (London, 1876); Wülker-Grein, *Bibliothek der Angelsächsischen Poesie*, Vol. I. (London, 1883); Wyatt (Cambridge, 1898). The editions of Thorpe and Arnold contain translations. See ENGLISH LITERATURE.

BEP′PO. A satirical poem on Venetian social life, by Lord Byron, published in 1818. The title character is captured by the Turks, and after an adventurous career as pirate, returns to his native Venice. He there finds that his wife, Laura, has become interested in another gallant, but he persuades her to return to her home. A character of the same name occurs in Auber's *Fra Diavolo*.

BEPPU, bĕp′pōō. A small seaport and celebrated sea-bathing resort, situated on the northeastern coast of the island of Kiushiu, Japan, 7 miles by rail from Oita (Map: Japan, B 7). It is celebrated for its hot baths of alkaline water, whose temperatures range from 100° to 132° F. The place is also a port of call for steamers.

BEQUEATH, bė-kwēᴛʜ′ (AS. *bcewēþan*, to say, affirm, leave by will, from pref. *be* + *cweaþan*, to say, cf. Engl. *quoth*). To leave personal property by will or testament to another, the gift so made being known as a bequest, or legacy (q.v.). In the law of real property, the corresponding term is *devise;* but the two expressions are in practice used interchangeably, and in English and American law with similar effect. In the Scotch law the terms bequeath and bequest are appropriate only to personal estate, and will not operate as a gift of real property. See WILL.

BEQUEST′. See BEQUEATH.

BÉRANGER, bā′räN′zhā′. PIERRE JEAN DE (1780-1857). A popular French lyric poet of Royalist parents and Republican principles. He was born in Paris. Neglected in childhood, he watched from a roof the storming of the Bastille, and imbibed Republican prejudices from an aunt at Peronne, where he became president of a boys' Republican club. He helped his father in business until bankruptcy, and was for a time reduced to great straits. The patronage of Lucien Bonaparte relieved him in 1804, and procured for him a clerkship in the university. Gratitude was thus joined to admiration for Napoleon, though he gently satirized the despotic Emperor in his *Roi d'Yvetot* (King of Yvetot, 1813), a song that first made Béranger popular. His first collection of songs (1815) cost him his clerkship for its liberalism and praise of Napoleon, but earned him distinction. A second collection (1821) brought fame, imprisonment, and a fine. A third collection appeared in 1825, and a fourth in 1828, for which he was fined 10,000 francs, paid by eager friends. He was also imprisoned for nine months, only to find his cell a reception-room for the most eminent men of the time. Two years later the Bourbons fell, but, rejecting the honors proffered by the Orleanists, Béranger retired to Passy, published a fifth collection of songs in 1833, and nothing further. He accepted the honor of an election to the Constituent Assembly of the Second Republic, took his seat, but immediately resigned it. Honors from the Second Empire he steadfastly refused. He died July 16, 1857, and was buried at public cost and with great distinction. Béranger was a worthy man and a good patriot, but he was eminently the poet of the masses—coarse, sensuous, grandiloquent. His songs deal with love, wine, politics, sentiment, and with Napoleon, whose mighty legend he did much to establish. Thus he continues the song-writing of the Eighteenth Century in his Gallic mocking spirit; while on the other hand, he is a thoroughgoing democrat whose belief in the wisdom of the majority is his creed. He reflected faithfully the mind of the great middle class, their Voltaireanism, their inclination to hero-worship, their love of good cheer, their complacent cynicism. This insured his popularity then, and maintains it still. A volume of poems written between 1834 and 1851 appeared as *Derniers Chansons* (Last Songs) after his death; also an autobiography (*Ma Biographie*, 1858). A *Vie de Béranger* was written and his *Correspondance* edited by Paul Boiteau (5 vols., 1860-61); Jules Janin, *Béranger et son temps* (1866), is also useful. Consult also: Sainte-Beuve, *Portraits contemporains*, I.; Brunetière, *Poésie lyrique;* Peyrat, *Béranger et Lamennais* (1861); Nivalet, *Souvenirs historiques et étude analytique sur Béranger et son œuvre* (Paris, 1892).

BERAR, bå-rär', or the HYDERABAD ASSIGNED DISTRICTS. A commissionership of British India, lying to the north of the Nizam's Dominions, "assigned" to the British for the maintenance of what is called the Nizam's contingent (Map: India, C 4). It lies between latitude 19° 20′ and 21° 40′ N., and between longitude 76° and 78° 2′ E. Area, 17,718 square miles. Population, in 1891, 2,897,000; in 1901, 2,752,400. It is well watered by tributaries of the Tapti and Godavari. The soil is peculiarly suitable to the cultivation of cotton. Capital, Ellichpur.

BÉRARD, bå'rär'. JOSEPH FRÉDÉRIC (1789-1828). A French physician and writer on physiology. He was educated at Montpellier, and was employed in Paris on the *Dictionnaire des sciences médicales*. He was professor of hygiene in Montpellier, where he died at the age of thirty-nine. His most important work is *Des rapports du physique et du moral* (1823), in which he holds that the manifestations of will and of instinct cannot all be attributed to a single active cause, the 'vital principle' of Barthez (q.v.). From the different phenomena of life he infers the existence of a purely spiritual substance—a soul—beside the principle of life, the two coexisting and exercising constant reciprocal action in the living and thinking being.

BERAT, bå-rät' (corrupted from Slav. *Belgrad*, white fort). A fortified town of European Turkey, in the Vilayet of Janina, situated on the banks of the Osum, about 30 miles northeast of the seaport of Avlona (Map: Turkey in Europe, B 4). The valley in which Berat stands is very fertile, producing large quantities of grain, oil, and wine. Population, about 12,000, including 4000 Greeks.

BÉRAUD, bå'rō', JEAN (1849—). A French painter. He was born in Saint Petersburg, of French parentage. Upon the conclusion of the Franco-Prussian War, in which he served with distinction, he became a pupil of Bonnat. He first exhibited at the Salon in 1874. The following are some of his principal works: *Léda* (1875); *The Return from the Funeral* (1876); *Soirée* (1878); *Condolences* (1879); *Public Ball* (1880); *Montmartre* (1881); *The Intermediary* (1882); *The Brewery* (1883); *Portrait of Coquelin* (1885); *Monte Carlo* (1890); *Harlequin* (1890); *Magdalen Among the Parisians* (1891).

BER'BER (evidently from Gk. *βάρβαρος*, *barbaros*, foreign, alien, of which the Ar. *Ratana* or *Ertana* is an equivalent; *Amazirg*, 'the free,' is the native name). A name applied to the early Hamite peoples of northern Africa and the Sahara west of Egypt. They are called Tuaregs in the desert: Shilluhs (Shluhs) in Morocco; Kabyles in Algeria and Tunis; and Amazirg or Mazys in their own speech. They have been mixed with negro peoples in some places, in others with Semites, as well as with Romans, Vandals, and later Europeans, to whom they are closely akin. Their color varies from that of the blonde descendants of the fair Libyans of the monuments to very dark; their stature also varies from tribe to tribe, the Mzabite Berber averaging 1.620 m., those of Tunis 1.663 m., of Biskra, 1.663 m., of Algeria 1.680 m.; the cephalic index is 77.3. They are agriculturists and herdsmen, and live in tents, adobe huts, or stone houses, according to locality. In textile, leather, and metal work they excel, though their mechanical appliances are antiquated. Their government is patriarchal.

BÉRBER, EL MEKHEIR, or EL MESHERIF. A town on the east bank of the Nile, a short distance below the confluence of the Atbara, about latitude 18° N., longitude 34° E. (Map: Africa, H 3). It is one of the main stations on the direct route from Khartum to Cairo, and a starting place for caravans going to Suakin, on the eastern coast. It is also connected by rail with Wady Halfa. Population, estimated at 10,000.

BER'BERA. The chief seaport of British Somaliland, situated on the Gulf of Aden, about 170 miles south of Aden (Map: Africa, J 3). The town has a good harbor and is the scene of an annual fair, lasting for some months, during which the population of the town is greatly increased and an extensive trade in coffee, gold-dust, ivory, cattle, etc., is carried on. The climate is healthful and the surrounding country very fertile. The permanent population is estimated at 25,000.

BER'BERIDA'CEÆ. An order of dicotyledonous plants, of which the different species of Barberry (q.v.) afford the best known examples. Many of the plants of this order are spiny shrubs; some are perennial herbaceous plants. Their leaves are alternate, often with dilated bases or stipules, their flowers sometimes solitary, sometimes in racemes or panicles. The calyx consists of three, four, or six deciduous sepals; the corolla, which arises from beneath the ovary, consists of petals either equal in number to the sepals, and opposite to them, or twice as numerous; the stamens are usually equal in number to the petals, and opposite to them; the anthers are two-celled, each cell opening by a valve which curves back from bottom to top, except in *Podophyllum*, in which the anthers split lengthwise; the carpel is solitary and one-celled; the fruit is either a berry or a capsule. The order contains 11 genera and 135 species, chiefly belonging to the temperate parts of the northern hemisphere, and of South America. The chief genera are Berberis, Podophyllum, Caulophyllum, Jeffersonia, Leontice.

BER′BERINE. A poisonous alkaloid found in many plants of the orders Berberidaceæ, Menispermaceæ, and Ranunculaceæ. If administered in small doses, it acts as a gastric bitter and improves the appetite. It is the chief alkaloid ingredient of the medicinal preparations of *hydrastis*.

BER′BERIS. See BARBERRY.

BERBICE, bĕr-bēs′. The eastern division of British Guiana (Map: Guiana, F 3). The capital, Berbice, or New Amsterdam, is situated on the estuary of the Berbice River, has a population of about 9000, and is an important commercial centre. See GUIANA.

BERCEUSE, bâr′sēz′ (Fr., cradle-song). A lullaby, a cradle-song; a vocal or instrumental piece of music with a soft and swinging melody. The German equivalents are *Wiegenlied* and *Schlummerlied*. Chopin's *Opus 57* is a most beautiful berceuse. The name may be applied also to some of the cradle-songs familiar in England and the United States, such as *Sleep, Baby, Sleep*, and *Sweet and Low*.

BERCHEM, bĕrk′em. A fortified suburb of Antwerp, Belgium, with a population, in 1900, of 22,000.

BERCHEM, CLAES PIETERSZ (1620-83). A Dutch landscape painter, the most important of the seventeenth-century group who in their choice of subjects deserted Holland for Italy in the manner of Claude Lorrain. He was born at Haarlem, the son of Pieter Claesz (the origin of the name Berchem, by which he is generally known, is uncertain), studied under van Goyen, J. B. Weenix, and Wils, and, though there is no positive evidence that he was ever in Italy, achieved marked success in landscape work of an Italian type with corresponding figures. He is more uniformly happy in drawing than in coloring, and his later development was not wholly an improvement, since he showed a tendency to exchange his faithfulness to nature for a more mannered style. He left more than 400 paintings, found especially in the Louvre and at Amsterdam, Munich, Vienna, and Dresden, besides numerous etchings.

BERCHET, bâr′shā′, GIOVANNI (1783-1851). An Italian patriotic poet and one of the leaders of the Romantic School in Italy. He was born in Milan, December 23, 1783. His connection with the *Conciliatore*, a semi-political organ, forced him, after the Revolution of 1821, to flee to England, where most of his earlier poems were published. *Profugi di Parga*, a denunciation of the English Government's attitude toward the people of Parga, was warmly commended by Manzoni. It was followed by *Romanze*, based upon Italian political subjects, which, by both their sentiment and their easy rhythm, became exceedingly popular, and earned Berchet the title of an Italian Tyrtæus. In 1829 came the *Fantasie*, in which an exile is supposed to review in a dream the past glories of the Lombard League. "It was," says Mazzini, "dictated by anger and pride; pride of ancient memories and anger at modern sluggishness." Between 1828 and 1848 Berchet lived alternately in France, Belgium, Germany, and Greece. In 1848 he returned to Italy, took an active part in the revolution of that year, and was appointed Minister of Public Instruction by the provisional Government of Milan. After the suppression of the revolution he retired to Turin and was at the time of his death, in 1851, a member of the Sardinian Parliament. There is an edition of his collected works, by Cusani (Milan, 1863), preceded by a good biographic sketch.

BERCHOUX, bâr′shōō′, JOSEPH (1765-1838). A French poet, born at Lay-lis-Saint-Symphorien (Loire). His first work was a satire, *Les Grecs et les Romains*, but it is as the author of *Gastronomie* that he is best known. Portions of this book have passed into proverbs, and have given its author the reputation of a gourmet, which, it is said, was undeserved.

BERCHTA, bĕrk′tȧ (same as modern Bertha, from OHG. *beraht*, MHG. *berht*, Engl. *bright;* cf. Lat. *Lucius*, from *lux*, light, and *Clara*, from *clarus*, clear, bright). In German mythology, the name given in the south of Germany and in Switzerland to a spiritual being, who was apparently the same as the Hulda (gracious, benign) of northern Germany. This being represented originally one of the kindly and benign aspects of the unseen powers; and so the traditions of Hulda (q.v.) in the north continued to represent her. But the Berchta of the south, in the course of time, became rather an object of terror, and a bugbear to frighten children; the difference probably arising from the circumstance that the influence of Christianity in converting the pagan deities into demons was sooner felt in the south than in the north. Lady Berchta has the oversight of spinners. The last day of the year is sacred to her, and if she finds any flax left on the distaff that day, she spoils it. Her festival is kept with a prescribed kind of meagre fare—oatmeal gruel, or pottage, and fish. If she catches any persons eating other food on that day, she cuts them open, fills their paunches with chopped straw and other such agreeable stuffing, and then sews up the wound with a plowshare for a needle, and an iron chain for a thread. In some places she is the queen of the crickets. She is represented as having a long iron nose and an immensely large foot. That she was once an object of worship is testified by the numerous springs, etc., that bear her name in Salzburg and elsewhere. It is likely that many of the sagas of Berchta were transferred to the famous Berthas of history and fable. The numerous stories of the 'White Lady' who appears in noble houses at night, rocks and nurses the children while the nurses are asleep, and acts as the guardian angel of the race, have doubtless their root in the ancient heathen goddess Berchta.

BERCHTESGADEN, bĕrk′tes-gä′den. A district in Upper Bavaria, occupying the southeastern end of the German Empire (Map: Germany, E 5). Its area is 240 square miles. It has a rocky, mountainous surface, and is noted for its picturesque scenery, which makes it a tourists' resort. There are a number of mountain lakes, among which the Königssee is the best known. Owing to the rocky soil of the district the inhabitants are engaged in other than agricultural pursuits. The district is rich in salt, marble, and wood, and the exploitation of these natural resources and wood-carving and cattle-raising constitute the chief occupations. The district of Berchtesgaden had a population of 18,748 in 1895. The chief settlement is the village of Berchtesgaden, situated a short distance from the Königssee. It has two churches of interesting architecture and a royal castle. Berchtesgaden constituted an ecclesiastical principality of the old German Empire, which was secularized in 1803.

BERCK, bârk. A summer bathing resort of the Department of Pas-de-Calais, France, on the English Channel, 28 miles south of Boulogne (Map: France, H 1). It is the terminus of a railway line, has a good harbor, fine sandy beach, a kursaal, and two hospitals for children. Population, in 1896, 7039.

BERCKHEYDE, bĕrk'hī-de, Gerrit (1638-98). A Dutch painter, born in Haarlem. He was probably a pupil of Frans Hals and of his elder brother, Job (q.v.), whom he accompanied on a tour to Cologne and Heidelberg, where they both found employment at the Court of the Elector Palatine. His principal works are the following: "View of Amsterdam" (Antwerp Museum); "Old City Hall" (1677); "Landscape with Castle Egmond" (Amsterdam Museum); "View of Cologne" (Rotterdam Museum); "View of Heidelberg Castle" (Copenhagen Gallery); "View at The Hague" (Berlin Museum); "View in Amsterdam" (Hermitage, Saint Petersburg).

BERCKHEYDE, Job (1630-93). A Dutch painter of landscape, architectural, and genre pictures. He was born in Haarlem, and at the age of fourteen entered the studio of Jacob de Wet, where he studied drawing. Afterwards he became a pupil of Frans Hals, and in 1654 was accepted as master in the Haarlem Guild. In his pictures he displays more talent and greater variety in the selection of his *motifs* than his brother Gerrit (q.v.). The following are some of his most celebrated works: "Joseph's Brethren in Egypt" (1669); "Interior of Old Exchange at Amsterdam" (1678; Brussels Gallery); "Courtesan's Room" (Rotterdam Museum); "Winter Landscape" (Berlin Museum); "Interior of Haarlem Cathedral" (1665; Dresden Gallery); "Artist's Portrait" (1675; Uffizi Gallery, Florence).

BERDIANSK, bĕr-dyänsk' (from the river Berdyanka, near the mouth of which it is situated). A seaport in the Russian Government of Taurida, situated on the northern shore of the Sea of Azov (Map: Russia, E 5). It has a good harbor, and a considerable trade in grain, wool, hides, and salt. There are three churches, a gymnasium, and a seminary for teachers. Population, in 1897, 27,247.

BERDITCHEV, bĕr-dē'chĕf. The capital of a district in the Government of Kiev, Russia, about 180 miles southwest of Kiev (Map: Russia, C 5). It is famous for its four annual fairs. At these, cattle, corn, country produce, carriages, and harness are sold in large quantities. Population, in 1897, 53,700, almost exclusively Jewish. The town is the private property of Count Tishkevitch, which fact is proclaimed by an inscription on a shingle over the city gate. The ground is leased to the owners of the buildings. It was in 1320 that the Grand Prince of Lithuania, Gedimin, made a gift of Berditchev, then an insignificant settlement, to the Tishkevitches, and it has remained the patrimony of the counts till the present day. At the close of the Sixteenth Century, Yanush Tishkevitch, the waywode of Kiev, built a castle here, to which he added a monastery in 1627. This was surrounded soon with strong walls and a moat as a protection against the frequent invasions of the Tartars and Cossacks. In 1647 Khmielnitsky successfully stormed Berditchev and robbed the monastery. The town figures prominently in subsequent conflicts between the Poles, the Cossacks and the Russians.

BERE'A or **BERŒA** (Gk. Βέροια, *Beroia*). (1) A place in Palestine, west of Jerusalem, where Judas Maccabæus fought his last battle and lost his life, B.C. 161 (1. Maccabees 9; 18). (2) A city of Greece, the modern Verria, in Macedonia, mentioned in Acts xvii. as visited by Paul after he left Thessalonica. It contained a Jewish synagogue. Here Paul and Silas founded a Christian community.

BEREA. A town in Madison County, Ky., 40 miles south by east of Lexington; on the Louisville and Nashville Railroad. It is the seat of Berea College (non-sectarian), a co-educational institution with a large preparatory department, first opened in 1853. Population, in 1900, 762.

BEREA. A village in Cuyahoga County, Ohio, situated 12 miles southwest of Cleveland; on the Lake Shore and Michigan Southern, the Cleveland, Cincinnati, Chicago and Saint Louis, and the Cleveland, Lorain and Wheeling (Baltimore and Ohio system) railroads (Map: Ohio, G 3). It is the seat of Baldwin University (Methodist Episcopal), opened in 1846, and of German Wallace College (Methodist Episcopal) established in 1864; and contains the German Orphan Asylum (Methodist Episcopal). The village is engaged principally in stone-quarrying and the manufacture of grindstones. The government is administered by a mayor, biennially elected, and a village council, chosen on a general ticket. The water-works and electric-light plant are owned and operated by the village. Population, in 1890, 2533; in 1900, 2510.

BEREA COL'LEGE, situated at Berea, Ky. It was organized as a school in 1855. The buildings and grounds are valued at $150,000 and the endowment at about $450,000. The College has a library of 20,000 volumes, a faculty of 30, and the students, in 1900, numbered 825, all but 50 of whom were in the Normal and Industrial Departments and in the elementary fitting schools. The most unique and important work of the College is in adapting education to the peculiar conditions found in the great mountain region of the South; to this end 'extension work,' including traveling libraries, lectures, and social settlements, has been instituted.

BEREA GRIT. See Sandstone.

BERE'ANS. An almost extinct sect of Christians, who originated in Scotland in the Eighteenth Century. Their name is derived from the circumstance that the inhabitants of Berea "received the Word with all readiness of mind, and searched the Scriptures daily" (Acts xvii. 11). The founder of the Bereans was the Rev. John Barclay, a native of Perthshire (born 1734, died 1798). From him they also received the name of Barclayans. They believe that the knowledge of God's existence and character is derived from the Bible alone, and not from reason or nature; that the Psalms of David do not relate to David at all, but exclusively to Christ; that assurance is of the essence of faith; and that unbelief is the unpardonable sin. In the ordinary points of doctrine they are Calvinistic. See BARCLAY, JOHN.

BERENDT, bā'rent, KARL HERMANN (1817-78). A German ethnologist. He was born in Danzig, studied medicine, taking his degree at Königsberg, and in 1843 settled as a practicing physician at Breslau, where he also lectured at the university. In 1851 he came to America, his political attitude during the preceding revolutionary period having rendered his stay in the fatherland undesirable. He went first to Nicaragua, where he devoted himself to the study of ethnography and natural history, and then, from 1855 to 1862, lived at Vera Cruz, in Mexico. Retiring from the practice of medicine, he devoted himself entirely to scholarly pursuits, and made a special study of the ethnology and linguistics of the Mayan tribes. In 1863 he came to the United States, and soon afterward made a journey to Yucatan, at the request of the Smithsonian Institution, which published the results of his investigations in its report for 1867. Two years later he was in Tabasco, Mexico, searching the ruins of Centla, and in 1874 went to Guatemala, and settled at Coban, where his time was divided between the study of the Mayan dialects and the raising of tobacco. Besides numerous contributions to scientific periodicals, he published, among other works: *Analytical Alphabet of the Mexican and Central American Languages* (1869); *Los escritos de Don Joaquin Garcia Icazbalceta* (1870); *Los trabajos linguisticos de Don Pio Perez* (1871); *Cartilla en lengua Maya* (1871).

BERENGAR, bā'ren-gär, I. (?—924). King of Italy from 888 to 924, and Roman Emperor after 915. He was originally Margrave of Friuli, and on the death of Charles the Fat (q.v.), in 888, he was crowned King of the Lombards. In the following year, however, he was defeated by Guido, Duke of Spoleto, who succeeded him as King. On the death of Lambert, son of Guido, in 898, Berengar was restored to his title, and in 915 he was crowned Emperor. Throughout his reign the nobles of Tuscany and Spoleto were opposed to him, and summoned to their aid northern princes who aspired to the imperial dignity. In despair, Berengar called in the dreaded Hungarians, and for this act, probably, he was assassinated in 924.

BERENGAR II. (?—966). The grandson of Berengar I. and King of Italy after 950. His enemies summoned to their aid Otho I. of Germany, and Berengar was obliged to become his vassal. After the death of Alberic, the ruler of Spoleto and patrician of the Romans, Berengar became very powerful. Again his enemies summoned Otho. Berengar was dethroned in 961 and imprisoned at Bamberg, where he died in 966.

BERENGARIA, bâ'rĕn-gä'rĭ-ȧ (?-c.1230). The Queen of Richard the Lion-hearted, King of England. She was the daughter of Sancho VI. of Navarre, and was betrothed to Richard soon after his succession to the throne, joining him in March, 1191, at Reggio in southern Italy, where the English King had arrived on his way to the Holy Land. She was married to him on May 12th at Limasol in Cyprus, and accompanied him to Acre, where the Queen remained while Richard was carrying on his campaigns against the Saracens. The English sailed from Acre in October, 1192. While Richard was a prisoner in Germany, Berengaria took up her residence in Poitou. After Richard's release from captivity an estrangement arose between him and Berengaria, and it is doubtful whether she ever rejoined the King. She died at Le Mans, in Maine, soon after 1230, and was buried in the Church of Pietas Dei at Espan, which she had founded. Berengaria was of remarkable beauty and exceedingly accomplished for her age.

BER'ENGA'RIUS OF TOURS, tōōr (c.1000-1088). A French scholastic theologian. He was born at Tours, in France. His master, Fulbert de Chartres, is reported to have prophesied on his death-bed that Berengarius would prove a dangerous man. He became a canon of Tours, and about 1040 preceptor of the school of St. Martin, in Tours, and archdeacon of Angers. Here he continued to deliver his metaphysico-theological prelections, and drew upon himself the charge of heresy, in reference to the doctrine of transubstantiation. He held the doctrine of Scotus Erigena, that the bread and wine in the sacrament of the Eucharist remained bread and wine, and that the faith of the believer who recognized their symbolic meaning transformed them only subjectively into the body and blood of Christ. This interpretation was condemned by Pope Leo IX. (1049-50), and also by King Henry I. of France. In 1054 he retracted his opinion before the Council of Tours; but what Berengarius meant by 'retraction' it is not easy to see; for he immediately returned to his conviction, and recommenced the advocacy of it. For this he was cited to appear at Rome, where he repeatedly abjured his 'error,' but never seems to have really abandoned it. Hildebrand, who was then Pope, treated him with great moderation; and at last, when he discovered how hopeless it was to bind down Berengarius by abjurations or declarations, he conceived it best to let him alone. Harassed and weakened by the attacks of the orthodox party, headed by Lanfranc of Canterbury, Berengarius finally retired to the Isle of St. Cosmos, near Tours, in 1080, where he spent the last years of his life in devotional exercises. He died January 6, 1088. The greater number of his works are lost. Such as are extant have been collected and published by A. F. and F. T. Vischer (Berlin, 1834). Chief is his *De Sacra Cœna.* Also in Migne, *Pat. Lat.* CLXXVIII. Cf. H. Sudendorf, *Berengarius Turonensis oder eine Sammlung ihn betreffender Briefe* (Berlin, 1850).

BER'ENGER, LADY EVELINE. A lady of imperious character in *The Betrothed*, by Scott. She is the daughter of Sir Raymond, and has been affianced to Sir Hugo de Lacy. The latter finally resigns her in favor of his nephew, Sir Damian.

BERENICE, bĕr′ė-nī′sė (named in honor of Berenice, Gk. Βερενίκη, *Berenikē*, mother of Ptolemy II.). An ancient town of Egypt, situated on a bay of the Red Sea, in about the same latitude as Assuan. It was founded by Ptolemy II., Philadelphus, in B.C. 275, as an emporium for the trade with Arabia and India. It was still very important in Roman time, as temple ruins bearing the name of Tiberius attest. The modern town is called Sikket Bender el-Kebir; the valley in which it is situated is called Wady Sakket. The old fortified caravan road of about 10 days' journey through the land of the Bisharin (q.v.) and Ababde is still traceable. The deserted ancient emerald-mines north of Berenice were discovered by Bruce.

BERENICE, bȧ′rȧ′nės′. (1) The name of a tragedy by Thomas Corneille (1657). (2) The title of a tragedy by Racine (1670). The plot was, at her own suggestion, concerned with Queen Henrietta of England.

BERENICE, bĕr′ė-nī′sė, or **BERNICE**, bẽr-nī′sė (c.28 ?). The eldest daughter of Herod Agrippa I., sister of Agrippa II., and wife of her uncle, Herod, King of Chalcis. After the death of her husband (48) she married Polemon, King of Cilicia, but soon deserted him and returned to live with her brother. She was accused by court scandal of incest with him, and it was before the pair thus besmirched that Paul (58) made his defense (Acts xxv. 23; xxvi. 30). Her younger sister was Drusilla, and her she made unhappy by her petty tyranny. In 68 she attracted the attention of Titus, later the Roman Emperor, who received her when she came to Rome in 75. Their contemplated marriage was, however, so unpopular that Titus gave it up and discarded her (79). Her death was at a time and place unknown.

BERESFORD, bĕr′*es*-fẽrd, Lord CHARLES WILLIAM DE LA POER (1846—). A British naval officer and parliamentarian, born in the county of Waterford, Ireland, the second son of the Rev. John, fourth Marquis of Waterford. He was educated at private schools, and entered the schoolship *Britannia* as cadet in 1859. He was made a sub-lieutenant in 1866, lieutenant in 1868, commander in 1875, captain in 1882, and rear-admiral in 1897. In 1896-97 he was aide-de-camp to Queen Victoria. At the bombardment of Alexandria in 1882 he was in command of the gunboat *Condor*, and succeeded in silencing one of the most formidable of the Egyptian batteries, under circumstances demanding the utmost skill and bravery. After the bombardment, and during the temporary occupation of the city, he acted as chief of police. In 1884 he served with the Nile column of the Gordon Relief Expedition, and commanded the *Sofia*, whose action, handicapped by a temporarily repaired boiler, saved the entire column. He was in command of the naval brigade at the battles of Abu Klea, Abu Kru, and Metemmeh. He was subsequently made a Commander of the Order of the Bath. With the possible exception of Lord Roberts and Lord Kitchener, he is more popular with the British people than any other naval or military officer. He served as a member of Parliament for Waterford (1874-80), East Marylebone (1885-90), and York (1898-1900), which latter seat he resigned to go into active service. In 1902 he was a member of Parliament for Woolwich, being at that time on the retired list. In 1898 Beresford went to China as the representative of the Associated British Chambers of Commerce, and returned by way of the United States, where he made important speeches advocating the 'open-door' policy in China, and a closer union of the United States, England, and Germany with regard thereto. He is an enthusiastic officer, and occupies his seat in Parliament as the avowed champion of the navy and its interests. He has written: *Life of Nelson and His Times; The Break-up of China* (1899); and many minor articles and essays on naval and Imperial questions, besides his numerous contributions to the *Times*.

BERESFORD, WILLIAM CARR, Viscount (1768-1854). A British general. He was the natural son of the first Marquis of Waterford, and was born October 2, 1768. He entered the army in 1785. After serving in India and elsewhere, he bore a conspicuous part in the reconquest of the Cape of Good Hope in 1806, and subsequently, with the rank of brigadier-general, was with the British filibustering force that surprised and took possession of Buenos Ayres. The population, however, on seeing the smallness of the force, banded together under the leadership of the French Chevalier de Liniers, and after a desperate resistance made the survivors prisoners of war. After six months' imprisonment, Beresford escaped, and reached England in 1807. In August, 1808, he joined the British Army in Portugal, and proceeded into Spain with Sir John Moore's force, was present at the battle of Corunna, and, after covering the embarkation of the troops, returned with them to England. Ordered a second time to Portugal, in February, 1809, to take command of the Portuguese Army, he succeeded in improving its discipline so greatly as soon to render it highly efficient for active service. Appointed marshal of Portugal in March, at the head of 12,000 men he attacked the French in the north of that kingdom, crossed the River Douro, drove Loison's division to Amarante, and uniting with the force under Sir Arthur Wellesley, pursued it in its retreat till it was utterly disorganized. For his services at the battle of Busaco, September 27, 1810, Beresford was nominated a Knight of the Bath. He commanded at the bloody battle of Albuera, May 16, 1811; and for the victory there gained over Soult he received the thanks of Parliament. He was present at Badajoz, at Salamanca, where he was severely wounded, and at various engagements in the Pyrenees. In 1814 he distinguished himself at the battle of Toulouse. In 1814 he was created Baron, and in 1823 Viscount, Beresford. He also bore the Spanish title of Duke of Elvas, and the Portuguese, of Conde de Trancoso. He received rich rewards from the British Government, and in the Wellington administration (1828-30) he was appointed to the high office of master-general of the ordnance. He died January 8, 1854.

BERETTINI, bĕr′ĕt-tē′nė, PIETRO. See CORTONA, PIETRO DA.

BEREZIN, byĕr′-*ye*-zēn′, ILYA NIKOLAYEVITCH (1818-96). A Russian Orientalist and traveler. He was born in the Government of Perm, and studied Oriental philology at the University of Kazan. In 1846 he was appointed professor at the University of Kazan, and after 1848 spent some time in Siberia, where he continued his studies in philology and ethnology. In 1855 he was appointed professor of the Turkish language and literature at the University of Saint Petersburg. His more important works (in Russian) include: *Library of Oriental Authors*, 3 vols. (1849-51); *Tour Through Daghestan and Trans-Caucasia* (1850); *A Grammar of the Persian Language* (1853); *The Mongol Invasion of Russia* (1852-54); *Popular Turkish Sayings* (1857). In French he wrote *Recherches sur les dialectes Musulmans* (1848-53). He also edited Rashid Ed-Din's *History of the Mongols*, Vols. I.-III. (1858-65), and the *Russian Encyclopedic Dictionary*, 16 vols. (1872-70).

BERESINA, byĕr'ye-zê-nä'. A river of Russia, tributary of the Dnieper, rising in the northern part of the Government of Minsk, in a low, marshy region, near the town of Beresina (Map: Russia, C 4). It flows in a southeasterly direction, and joins the Dnieper after a course of about 335 miles. It is navigable for the larger part of its course, but its commercial importance has considerably decreased on account of the adjacent railway lines. The Beresina is connected by a canal system with the Dvina.

The Beresina is memorable for two military passages. The first one was effected by the troops of Charles XII. of Sweden in June, 1708, for the purpose of invading Little Russia. The second and the more famous occurred on November 26-29, 1812. In his retreat from Moscow, Napoleon reached the Beresina at Studyanka on November 25, and as the bridge at Torisov had been destroyed, he ordered the construction of two bridges at the former place. The work was completed on the 26th and the passage was begun immediately, covered by 1700 men (later increased by 4000) under Marshal Victor. On the 26th and 27th, the corps of Oudinot, Ney, a part of the artillery, and the Guards succeeded in crossing the river. On the 28th the Russian artillery began to bombard the bridge, and in the panic which ensued among the crossing troops (mostly unarmed), a large number of Frenchmen perished. It is estimated that over 10,000 Frenchmen, many of whom were sick and wounded, were lost, and that about 15,000 were made prisoners.

BEREZOV, byĕr-yä'zŏf. A district town of the Siberian Province of Tobolsk, situated on the Sosva, a branch of the Obi, about 700 miles from Tobolsk. It lies in a rough country, covered with thick forests, and has a severe climate. Among the noted personages exiled to this place in the Eighteenth Century were Menshikov, who died there, and Dolgoruki. Population, in 1897, 1073.

BERG, BURG, BURGH (AS. *beorg*). Words entering into the composition of many names of places. *Burg*, or *burgh*, means fort, castle, citadel, probably from being situated on a hill or eminence. See BOROUGH; BURGH.

BERG, bĕrk. A former duchy of Germany, now comprised in Prussian Westphalia, and situated on the Rhine between Cologne and Coblenz. Anciently a countship, it became a duchy in the Fourteenth Century. Napoleon bestowed the duchy on Murat in 1806, but in 1815 it was ceded to Prussia by the Congress of Vienna.

BERG, FRIEDRICH WILHELM REMBERT, generally known as FEODOR FEODOROVITCH BERG (1790-1874). A Russian field-marshal. He was born at the Castle of Sagnitz, Livonia. He became a captain in the Russian Army after the entry of the Allies into Paris, was advanced to the rank of colonel, and from 1822 to 1824 commanded several expeditions against the Kirghiz tribes. As major-general he took a conspicuous part in the Russo-Turkish campaign of 1828-29, and in that against the Poles in 1831. He was successively advanced to the rank of lieutenant-general, general of infantry, and quartermaster-general on the Imperial General Staff. In 1849 he was Minister Plenipotentiary of the Russian Government to the Court of Austria. During the Crimean War he defended Revel and Esthonia against the Allied fleets, and in 1855, as Governor-General of Finland and commander-in-chief of the troops stationed there, he repulsed (August 8-10) a vigorous attack upon Sveaborg. For this service he was elevated to the nobility in 1856. Owing to his strenuous opposition to a liberal policy for Finland, he was compelled, in 1861, to resign his position as Governor-General of that province, and was transferred in the same capacity to Poland in 1863, where he soon succeeded in quelling the insurrection. He became field-marshal in 1866.

BERG, bĕrg, JOSEPH FREDERICK (1812-71). A Dutch-Reformed clergyman, born at Grace Hill, Antigua, West Indies, June 3, 1812. He was the child of Moravian missionaries, and so was educated by Moravians in England and the United States, to which country he came in 1825. He served in the ministry of the German-Reformed Church, 1835-52, but from that date on was in the Dutch-Reformed Church, and from 1861 till his death in New Brunswick, N. J., July 20, 1871, was professor of didactic and polemic theology in the theological seminary of the denomination in that place. His reputation rests upon his intense opposition to the Church of Rome as a theological, ecclesiastical, and political organization. Many are his translations and original works upon this theme. The best known, perhaps, is his translation of the *Synopsis of the Moral Theology of Peter Dens, as Prepared for Romish Seminaries and Students of Theology* (Philadelphia, 1842, new ed. 1856). He was a man of wide learning and considerable conversational power. For a sketch of Berg, with bibliography, consult Corwin, *Manual of the Reformed Church in America* (New York, 1879).

BERG-ADDER. The South African puff-adder (q.v.).

BERGAIGNE, bâr'gân'y', ABEL (1838-88). A French Sanskrit scholar. He was born at Vimy, August 31, 1838, and died August 6, 1888. His name is a prominent one in the field of Sanskrit philology, in which he won distinction, especially by his contributions to the interpretation of the Veda. He was professor of Sanskrit at the Sorbonne, and among his published works, *Le religion védique*, 3 vols. (Paris, 1883), is the most important. Mention may also be made of his excellent translation of the Sanskrit drama *Nagananda* (Paris, 1879).

BERGAMA, bĕr'gȧ-mȧ (anciently, Gk. Π*έργαμον*, *Pergamon*). A city of Asiatic Turkey, Vilayet of Smyrna, situated in a beautiful and fertile valley, on the right bank of the Caicus, about 40 miles north-northeast of Smyrna. In early times. the city was the capital of the kingdom of Pergamus (q.v.). Many ruins still exist to attest the former magnificence of Bergama. The present population is estimated at 6000.

BERGAMASCO, bĕr'gȧ-mäs'kō, IL. See CASTELLO, GIOVANNI BATTISTA.

BERGAMO, bĕr'gȧ-mō (the town on the hill. from Celt. *brig.* Ger. *Berg*, hill). A city, capital of the Province of Bergamo. in north Italy. 33 miles northeast of Milan (Map: Italy, D 2). It consists of two distinct sections. the upper city and the lower city. connected by the Via Vittorio Emanuele and by cable-cars. In the lower city are other street railways. The appearance of the upper city, with its hilly streets. its ancient buildings, and its girdle of lofty, bastioned walls, now turned into promenades. is picturesquely mediæval: that of the city on the plain. with its factories and shops, entirely modern. In the old city, grouped around the Garibaldi Place. which contains a bronze statue of Garibaldi. are the mediæval Broletto, which now holds the library of 70.000 volumes, and the first story of which is an open colonnade, containing a statue of Torquato Tasso: the Palazzo Nuovo. which has now been converted into a technical school: the cathedral. the interior of which was restored in the Seventeenth Century: the beautiful Twelfth-Century Church of Santa Maria Maggiore, which contains the monuments of the musicians, Donizetti and Mayr: the Colleoni Chapel. with its art treasures, and the city hall. In the Accademia Carrara. in the new city, is an important collection of paintings. In industry and commerce Bergamo is one of the busiest cities in Italy, and was the first to introduce the culture and the manufacture of silk. Other manufactures are those of clothing. hats, iron implements, majolica-ware, confectionery, and organs. The railway put an end to the importance of the once famous fair of San Alessandro. The ancient Bergomum was a Gallic settlement. which received civic rights from Cæsar. The town became part of the Venetian dominion in 1428. Population, in 1881, 40.000; in 1901, 46.000.

BER'GAMOT (from the Italian city *Bergamo*). *Citrus medica.* A variety of lime or lemon with a very aromatic rind. yielding. either by expression or distillation. the volatile Oil of Bergamot (known in trade as *essence of bergamot*). The oil is a product chiefly of southern Italy, and is much used in perfumery. It is a thin. greenish liquid with a bitter taste. Its peculiar aromatic odor is due probably to linalyl acetate. $CH_3COOC_{10}H_{17}$. of which it contains about 20 per cent.

The name ‘bergamot’ (evidently a corruption of Turk. *beg armūdi*, a lord's pear) is also applied. in Great Britain and upon the Continent of Europe, to various kinds of pears. to which, however. no common distinctive character can be assigned. The proper bergamot-pear is a flattish. rough-skinned pear with a long stalk. It has a very soft and juicy pulp of an extremely pleasant flavor, and is esteemed as one of the best dessert pears. Metzger. in his work on the pomaceous fruits of the south of Germany (Frankfort. 1847). described no less than forty-seven kinds of pears that bear the name of ‘bergamot.’ although some of them are very different from one another.

Finally, ‘bergamot’ is also the popular name of several labiate plants. as in England of *Mentha citrata*, and in the United States of *Monarda fistulosa* and *Monarda didyma.*

BERGAMOT, OIL OF. See BERGAMOT.

BERGEDORF, bĕrĸ'*e*-dôrf. A town of northern Germany. situated on the Bille, 10 miles southeast of Hamburg, and connected with the Elbe by a navigable canal (Map: Germany, D 2). It gives its name to the surrounding agricultural territory, and has important manufactures of glass and enameled ware. It is the birthplace of the composer, Johann Adolf Hasse. Population, in 1890, 6957: in 1900, 10.243. Bergedorf was held jointly by Lübeck and Hamburg until 1867, when Lübeck resigned its rights to Hamburg on payment of 200,000 thalers.

BERGEN, bĕr'gen (Ger. *Berg*, hill, referring to its position). A Norway seaport in the province of the same name. situated on a promontory at the head of a deep bay, called Vaagen, on the Atlantic coast. in latitude 60° 24' N., longitude 5° 18' E. (Map: Norway, A 6). With the exception of the northeast side. where lofty mountains inclose it, Bergen is surrounded by water. It is walled. and additionally protected by several forts. now used merely as barracks and depots for supplies. The entrance to the harbor is dangerous without a pilot, but within it is safe and commodious. Though it lies farther north than Saint Petersburg, its climate is very mild and moist. winter being of short duration. The thermometer seldom drops below 18° Fahr.. but the rainfall is heavy, averaging seventy-two inches. Bergen is built in a semicircular form round the harbor, and has a picturesque appearance from the sea. It is generally well and substantially built, the older houses being of wood, and the streets being intersected by open spaces as a precaution against fires. A portion of the city burned in 1855 has been rebuilt very regularly. An electric street railroad runs through the city. Its chief buildings are the cathedral and nautical school. the public library with 80.000 volumes. the observatory, and the general museum. Bergen's principal industries are ship-building and barrel-making. The city's chief importance is derived from the codfishing trade on the north coast, the place being the great fish market of Norway. Twice a year the Norlandmen come to Bergen with their fish. In March and April several hundred vessels are to be seen in the harbor of Bergen at once. laden with the produce of the winter fishing and with skins and feathers. The summer fishing is not quite so productive. Codfish for salting. fish-roe, blubber. skins, herrings, and cod-liver oil are the chief exports. amounting to two-fifths that of the entire country. A fair, attended by fishermen of all nations. is annually held. A fishery museum was established here in 1881. The chief imports are brandy, wine, corn, cotton. woolens, hemp, sugar, coffee. etc. Bergen is second only to Christiania in the export and shipping-trade of Norway, and her citizens own one-third of the shipping of the country. The United States is represented by a consul. There is a marine biological station here. Bergen was founded in 1069 or 1070, by Olaf Kyrre, who made it the second city in his kingdom, and it was soon raised to the first rank. The black pestilence which ravaged Norway first made its appearance in Bergen in 1348, and the city was afterwards several times devastated by it. The first treaty entered into by England with any foreign nation was made with Bergen in 1217. But the English and Scottish traders were soon displaced by the merchants of the Hanse towns, who made Bergen one of their four depots, compelled the fishermen to trade here exclusively, and continued to exercise and abuse their monopoly until their supremacy was broken by an act issued by Frederick II. of Denmark, in 1560. In 1763 their last warehouse fell into the hands of a citizen of Bergen. Population, in 1891, 53,864; in 1901, 72,179.

BERGEN. The capital of the island of Rügen, Pomerania, Prussia, and of the neighboring islands. It has a fine Twelfth-Century Romanesque church, with a lofty tower. There is a museum of local antiquities in the Rathaus. A fine view is obtained from the Rugard, 320 feet high, near the town; this hill is crowned by the ruins of a fortification destroyed in 1316, and by a commemorative tower to Arndt the poet. Bergen has domestic and fishing industries. Population, in 1900, 4005. Consult Haas, *Geschichte der Stadt Bergen auf Rügen* (Bergen, 1893).

BERGEN, bẽr′gen, Joseph Young (1851—). An American scientist, born at Red Beach, Maine. He graduated in 1872 at Antioch College (Yellow Springs, Ohio), and was for a time successively a member of the Ohio Geological Survey and professor of natural sciences in Lombard University (Salisbury, Ill.). In 1883 he became principal of the Peabody (Mass.) high school, and subsequently an instructor in the English high school of Boston. His publications include a text-book of *Physics* (with Prof. E. H. Hall, 1891) and *Elements of Botany* (1896).

BERGEN-OP-ZOOM, bĕrᴋ′en-ŏp-zōm′ (Dutch 'the hill-fort on the Zoom'; Ger. *Berg*, hill). A town in the Province of North Brabant, Netherlands, about 20 miles north of Antwerp, on the river Zoom, at its mouth in the east branch of the Scheldt (Map: Netherlands, C 3). It contains an old castle, the old Gothic 'Great Church,' the Margrave's palace, which has been converted into barracks, and the town-hall, of interest for its portraits. Bergen-op-Zoom's chief industries are pottery and brick-making, and it also exports considerable quantities of oysters and anchovies. The town is connected by a canal with Antwerp, and has railway communication with other cities. Bergen-op-Zoom was taken by the Dutch in 1576, and successfully held against the Spanish all through the War of Independence, during which it sustained five sieges. It was strongly fortified by the engineer, Cochorn, but was, nevertheless, taken by the French under Löwendal in 1747. In 1794 it capitulated to the French under Pichegru. Population, in 1899, 13,668.

BERGENROTH, bĕrᴋ′en-rōt, Gustav Adolf (1813-69). A German historian. He was born at Oletzko (East Prussia), and studied at the University of Königsberg. He entered the diplomatic service, from which he was dismissed for participation in the Revolution of 1848, and in 1850-51 was in America. In 1857 he settled in England, there to pursue in the State archives investigations concerning the times of the Tudors. To this end he also visited Simancas, Spain, and in 1862-68 published in London his *Letters, Dispatches, and State Papers Relating to the Negotiations Between England and Spain* (3 vols.).

BERGER, bĕrᴋ′ẽr, Ludwig (1779-1839). A German pianist and composer, born in Berlin, where he studied with Gürrlich and Clementi. He followed Clementi on his concert tours to Saint Petersburg (1805), Stockholm and London (1812). Afterwards he returned to Berlin, where he became the instructor of Mendelssohn, Taubert, Henselt, and many other rising artists of the day. His pianoforte works, such as the *Toccata*, the *Studies*, and the *Rondo*, are still popular.

BERGER, bâr′zhā′, Philippe (1848—). A French Orientalist, born at Beaucourt, Alsace. He studied at Strassburg and Paris, and was assistant librarian of the institute and professor of Hebrew at the Sorbonne. He succeeded Renan as professor of Hebrew, Syriac, and Chaldee at the Collège de France. He published *L'Ecriture et les inscriptions sémitiques* (1880); *L'Arabie avant Mahomet* (1885); *Histoire de l'écriture dans l'antiquité* (1892); *Etudes sur les renseignements fournis sur le gnosticisme par les Philosophoumena* (1893), and other works.

BERGERAC, bâr′zhrȧk′ (*Brageracum* of the Middle Ages). A town in the Department of Dordogne, France, about 25 miles south-southwest of Périgueux (Map: France, G 7). It is situated in a fertile plain on the right bank of the river Dordogne, which is here crossed by a fine bridge of five arches. It has a fine Gothic church, Notre Dame, built in 1856, a court-house, and is the seat of a Protestant Consistory. Its industries comprise breweries, tan-yards, paper-mills, extensive production of serges, earthenware, iron, copper-ware, hats, and hosiery. It has a large trade in truffles, wine, brandy, etc., being in fact the entrepôt of trade in the department, which is celebrated for its wine, known as Bergerac, or 'small champagne.' Population, in 1896, 15,642. Bergerac was taken and fortified by the English in 1345, who, after being driven out by Louis of Anjou, again got possession of it, and retained it until 1450. The town suffered greatly in the religious wars. It was dismantled by Louis XIII. in 1621.

BERGERAC, Savinien Cyrano de (1619-55). A French novelist and dramatist, important in the development of realism in the novel and on the stage. He was born in Perigord, and educated at the Collège Beauvais, whose principal was the butt of his satire in *Le pédant joué* (1654). Later he derived from Gassendi an interest in science, and from Campanella some astrological lore. He divided his young manhood between literature and gay adventure, served two years in the Guards (1639-41), and was twice wounded. He had through life the reputation of a reckless duelist. He traveled in England and Italy, possibly also in Poland. He died as the result of an accident after an illness of fourteen months, during which it is claimed that his manuscripts were mistreated and altered by the Jesuits. He had published during his short and restless life a volume of letters largely satirical, a political satire on Mazarin as *Le ministre d'état flambé*; *Agrippine*, a tragedy (1653); and *Le pédant joué*, a comedy (1654). His most famous book, *Histoire comique des états et empires de la Lune*, appeared in 1656 (possibly in 1650), followed in 1661 by *Histoire comique des états et des empires du Soleil*. These books were suggested indirectly by Lucian, Dante, and Ariosto, but immediately by the English Godwin's *Man in the Moon* (1638), and Wilkins's *Discovery of a New World*, i.e. the moon (1638). Thus Bergerac was one of the first in France to show the influence of English fiction. His stories furnished suggestions to Fontanelle, Voltaire, Restif de la Bretonne, Edgar Allan Poe, and Jules Verne, possibly, also, to Swift; but the only editions known have evidently passed through a bungling censorship, probably that of the Inquisition, for Bergerac was a free-thinker, who had dared to write "Reason alone is my queen," even in the day of Bossuet. What is left is verbally orthodox, but mockingly ironical. Even so, the books reveal a mind of great originality and power. Both Comic Histories involve much of the science of the day, much superstition ironically introduced, a keen satire on the Inquisition in Galileo's case, a defense of Copernicus, many fine descriptive passages, and some startling forebodings of modern discoveries (like the phonograph), of a universal language (Volapük), and of the Wagnerian tone-drama. Through all runs a gasconading humor. His own large nose is justified by the moon-children, who tell him that it is the infallible sign of "a witty, courteous, affable, generous, open-minded man." Such little personal touches and a rare power of relating the impossible with logically and mathematically consistent detail give an air of probability to his most whimsical fancies. They are planless, and as works of literary art their place is low; but Bergerac was the first to use the novel to teach natural science, and so was a forerunner of the encyclopædists of the next century, just as in the drama he had been first to break definitely with the unities in tragedy, which were not to be wholly done away till 1830, and his *Pédant* is almost the first French comedy of character in prose. The *Comic History of the States and Empires of the Moon and of the Sun* is reprinted with a scholarly introduction by Paul Lacroix (Bibliophile Jacob, 1858). There are two English contemporary translations and a modern partial one, called forth by the popularity of Rostand's (q.v.) drama, *Cyrano de Bergerac*. See the *Life and Study*, by Brun (1893). Bibliographical details and an appreciative critical essay are in Körting's *Geschichte des französischen Romans im XVII. Jahrhundert*, II. 169-205 (Leipzig, 1885-87).

BERGERAC, Cyrano de. A tragedy by Edmond Rostand, in five acts, based on the life of Cyrano de Bergerac and the stories concerning him. The title-rôle was first played in Paris, by Coquelin, at the Porte Saint-Martin Théâtre, on December 28, 1897, and in New York, by Mansfield, on October 3, 1898. See Rostand.

BERGERAT, bârzh'rȧ', Emile (1845—). A French author. He was born in Paris, and was educated by the Jesuits and at the Lycée Charlemagne. He first devoted himself to painting and afterwards to journalism. He became widely known through his *Biographies contemporaines* (1875), his biography of *Théophile Gautier* (1884), and above all by his admirable *feuilletons* in *Figaro*, to which journal, under the pseudonym of 'Caliban,' he regularly contributed caricature sketches. These *feuilletons* have been collected under the following titles: *Vie et aventures du Sieur Caliban* (1886); *Le livre de Caliban* (1887); *Figarismes de Caliban* (1888); *Le rire de Caliban* (1890); *Les soirées de Calibangrève* (1892). He also published a number of pamphlets, novels, and dramas, the dramatic poem *Enguerrande* (1885), and the admirable humorous poems entitled *La lyre comique* (1889), the latter being descriptive of the life of Paris.

BERGH, bĕrg, Henry (1820-88). An American humanitarian. He was born in New York, and educated at Columbia University. He was secretary of legation at Saint Petersburg and vice-consul, 1862-64, but resigned, owing to the severity of the climate. In 1865 he became interested in the treatment of domestic animals, and in the face of much opposition and ridicule succeeded, in 1866, in getting an incorporation of the American Society for the Prevention of Cruelty to Animals. The work of the society, covering all cases of cruelty to all sorts of animals, commended itself to the better class of the people, and its growth, aided by numerous gifts, was rapid and substantial. In 1886 the laws which Bergh had procured for the State of New York had been adopted by thirty-nine States of the Union, also in Canada, Brazil, and the Argentine Republic. Bergh was also the founder of the Society for the Prevention of Cruelty to Children, which is now established in nearly every State and Territory of the Union. He wrote several plays, among them *Love's Alternative*, a drama, also *The Streets of New York*, a volume of tales and sketches.

BERGH, Johan Edvard (1828-80). A Swedish landscape painter. He studied at the academy of his native city, Stockholm, where he received the first prize in 1853. Afterwards he pursued his studies with Gude at Düsseldorf, and with Calame at Geneva. After a tour through Italy (1856-57) he became member of, and in 1861 professor in, the Stockholm Academy. He may be said to have founded a new school of landscape painting in Sweden—a school characterized by accuracy of drawing, faithful interpretation of nature, and a marked spirit of nationalism, manifested both in choice of subjects and method of treatment. Among the most popular paintings of Bergh are the following: "Wood Interior" (Stockholm Museum); "Beech-Wood" (Gothenburg); "View of Stockholm" (owned by King Edward VII.); "View in Dalecarlia" (Amsterdam).

BERGH, Laurent Philippe Charles van den (1805-87). A Dutch historian. He was born at Düsseldorf, and studied at Utrecht. He was archivist of the Government of The Hague from 1865 to 1887. His numerous and valuable publications include the following: *Verslag der historischen nasporingen op gezag van het gouvernement in 1838 in Frankrijk gedaan* (1840); *Gedenkstukken tot opheldering der nederlandsche geschiedenis, opgezameld uit de archieven te Rijssel en op gezag van het gouvernement uitgegeven* (1824-47); *Register van hollandsche en zeeuwsche oorkonden* (1861); *Oorkondenboek van Holland en Zeeland* (1868).

BERGH, Pieter Theodor Helvetius van den (1795-1873). A Dutch poet. He was born at Zwolle, and lived successively in Paris, Brussels, and Vienna. Afterwards he became blind and returned to The Hague, where, in collaboration with Weiland, he edited the *Magazijn voor Toon- en Schilderkunst.* His comedy, *De Neven* (1837), was very favorably received, and is ranked among the best modern works of its class. Among his other works may be mentioned: *De Nichten* (1842); *Proza en Poëzij* (1863).

BERGHAUS, bĕrk′hous, Heinrich (1797-1884). A German geographer, born in Cleves, Prussia. In 1816 he was made 'geographical engineer' in the War Department in Berlin, and was employed on the trigonometrical survey of Prussia. In 1825 he became professor of applied mathematics in the Architectural Academy of Berlin, and in 1839 director of a school of geography in Potsdam. The best known of his cartographical works is his *Physikalischer Atlas* (90 plates, Gotha, 1838-48), which forms the basis of Johnston's work of the same title, published in Edinburgh. In 1856-60 he published a work entitled *Was man von der Erde weiss.* In 1855-60 appeared an *Atlas der österreichischen Monarchie*, and *Landbuch der Mark Brandenburg.* In 1882 appeared his *Landbuch von Pommern*, and in 1863, *Briefwechsel Alexander von Humboldts mit H. Berghaus.*

BERGHAUS, Hermann (1828-90). A German cartographer, nephew of Heinrich Berghaus. He was born at Herford, Westphalia. From 1852 he was employed in the Geographical Institute of Justus Perthes at Gotha, and besides the widely known *Chart of the World* (1863), which has passed through eleven editions, he published *Physikalische Karte der Erde* (1874); *Physikalische Wandkarte von Europa* (1875); *Karte der Alpen* (1878); *Physikalische Wandkarte von Afrika* (1881); and the revised edition of his uncle's great *Physikalischer Atlas* (1886), in which he was aided by a number of noted specialists.

BERGK, Theodor (1812-81). A distinguished German classical scholar. He was born in Leipzig, in 1812, and from 1842 to 1869 was professor of philology at Marburg, Freiburg, and Halle. In 1869 ill health forced him to resign, and the remainder of his life was spent in the preparation of his *Geschichte der griechischen Litteratur*, of which he finished only the first volume in 1872, the other two being edited by G. Hinrichs, 1883-84. Bergk's chief complete work is his *Poetæ Lyrici Græci* (3 vols., Leipzig, 1843; 4th ed., 1878; Vol. I. in 5th ed. by Schroeder, 1900). He also published numerous philological papers and several editions of individual Greek poets. He died July 20, 1881.

BERGMAN, bĕrg′mån, Torbern Olof (1735-84). A Swedish chemist and mathematician. He was born at Katharinberg. He was sent to the University of Upsala, with a view to prosecute studies qualifying him either for the Church or the bar; but disliking both, he devoted himself to natural history, physics, and mathematics, and soon made some interesting discoveries in entomology, and distinguished himself as an astronomical observer. In 1758 he was made professor of physics, and several years later, after publishing an excellent work on the manufacture of alum, professor of chemistry and mineralogy, at the University of Upsala. Bergman published a vast number of dissertations, a collection of which, in six volumes, appeared at Upsala in 1779-81, under the title *Opuscula Torberni Bergman, Physica, Chemica, et Mineralia.* His celebrated essay on *Elective Attractions* was translated into English by Dr. Beddoes. According to Bergman's theory, substances have certain definite affinities for one another, which determine completely the course of all chemical transformations. Thus, let A be a substance capable of combining with either B or C, and let its affinity for the substance C be greater than its affinity for the substance B. Then, if brought in contact with a mixture of B and C, A will combine with C alone. Again, if C be brought in contact with the compound AB formed by the union of A and B, decomposition of AB will take place; B will be set free and A will unite with C to form the compound AC. A quarter of a century later the French chemist Berthollet (q.v.) set forth the view now adopted universally that chemical transformations depend not only upon the affinities, but also upon the relative masses of the reacting substances.

BERGMANN, bĕrk′mån, Ernst von (1836—). A German surgeon, born at Rujen, Livonia, Russia. He studied at the universities of Dorpat, Vienna, and Berlin, was connected with the hospital service in the War of 1866 and the Franco-Prussian War, and in 1871-78 was professor of surgery at Dorpat. From 1878 to 1882 he was professor at the University of Würzburg, and in the latter year was appointed professor of surgery at Berlin. His publications include the following treatises: *Zur Lehre von der Fettembolie* (1863); *Die Resultate der Gelenkresektionen im Kriege* (Giessen, 1874); *Die Lehre von den Kopfverletzungen* (1880); and *Die chirurgische Behandlung von Hirnkrankheiten* (1898).

BERGMANN, Julius (1840-1904). A German philosopher. He was born at Opherdike, Westphalia, and studied philosophy and mathematics at the universities of Göttingen and Berlin. In 1872 he became professor of philosophy at Königsberg, and in 1875 was called to Marburg in the same capacity. The following are among his principal works: *Grundlinien einer Theorie des Bewusstseins* (1870); *Zur Beurteilung des Kriticismus* (1875); *Reine Logik* (1879); *Sein und Erkennen* (1880); *Die Grundprobleme der Logik* (1882, rev., 1895); *Geschichte der Philosophie* (Vols. I and II., 1892-94); *Untersuchungen über Hauptpunkte der Philosophie* (1900).

BERG′MANN, Karl (1821-76). An American musician. He was born at Ebersbach, Saxony, studied at Zittau and Breslau, and came to America in 1850 as a member of the Germania Orchestra, the leader of which he afterwards became. From 1862 until his death he was conductor of the Philharmonic Orchestra in New York City, and in this capacity contributed greatly to the advancement of good music in America.

BERGMEHL, bĕrk′mâl. See Diatomaceous Earth.

BERGSÖE, bĕrg′sẽ, Jörgen Vilhelm (1835—). A Danish naturalist, novelist, and poet, born in Copenhagen. In the course of biological researches at Messina he became partly blinded by excessive use of the microscope, and so was diverted to fiction. His first novel, *Piazza del Popolo* (1866), was very successful, and was followed by many others, of which *Who Was He?* is the best. A volume of poems, *Now and Then* (1867), is inferior, but all his work shows a marked originality, an exuberant imagination, close observation, and a delicate touch.

BERGUES, bârg (probably from Ger. *Berg*, hill, fort). A fortified town of France, in the Department of Le Nord, about 34 miles north of Lille (Map: France, J 1). It is situated on the Colme, at the foot of a hill, and has facilities for laying the valley under water, as a defensive measure in war time. A canal, which admits vessels of 300 tons burden, connected Bergues with Dunkirk and the sea, and this circumstance, united with its central position, makes it the entrepôt of the adjoining country. It has manufactures of soap, tobacco, and earthenware, and also sugar and salt refineries. Population, in 1896, 4700. Bergues was first walled and fortified by Baldwin II., Count of Flanders, and Baldwin IV. erected a splendid abbey, of which two towers only remain, in honor of Saint Winnoc, who retired here in the beginning of the Tenth Century. Bergues has suffered all the vicissitudes of a frontier fortress; it was finally taken by Louis XIV. in 1667, and Vauban so effectively fortified it that the English found it impregnable in 1793.

BERGYLT, bĕr′gĭlt (Norweg. *berggylta*, from *berg*, hill, cliff + *gylta*, low). A European name for the rosefish (q.v.).

BERHAMPUR, bĕr′h*a*m-po͞or′. The name of two towns in British India. (1) A military station and capital of the District of Ganjam in Madras, in latitude 19° 20′ N., and longitude 84° 50′ E., 525 miles northeast of Madras, and 325 miles southwest of Calcutta (Map: India, D 5). The cantonments, on a rocky ledge, house 2000 troops, and command on the south and east a plain of considerable extent, on the near edge of which is the native town, noted for its manufactures of gold, embroidered turbans, and tussur-silk cloths. Population, about 23,800. (2) A town of Bengal, in the District of Murshidabad, on the left bank of the Bhagirathi, the first great offset of the Ganges, in latitude 24° 5′ N., and longitude 88° 17′ E., distant from Calcutta, by land and water respectively, 118 and 161 miles (Map: India, E 4). It was formerly one of the principal military stations in British India. The grand square, inclosing a spacious parade-ground, is particularly striking; and the quarters of the European officers form handsome ranges of brick-built and stuccoed edifices. There are here a college, hospitals, and mission churches. Berhampur is the seat of a civil establishment; and the houses of its chief members, erected in convenient spots in the neighborhood, give the place an air of grandeur and importance. Berhampur, though at one time extremely unhealthy from its low and moist site on the delta of the Ganges, has been so much improved by sanitary measures as to be second to no spot in Bengal in salubrity. The first outbreak of the Sepoy Mutiny occurred at Berhampur in the spring of 1857. Population, about 23,500.

BERIBERI, bā′rĭ-bā′rĭ. See Neuritis.

BERING, bē′rĭng, *Dan. pron.* bā′rĭng, sometimes **BEHRING**, Vitus (1680-1741). A Danish navigator, born at Horsen, in Denmark. He entered the service of Russia, and was employed on the great northern expedition planned by Peter the Great to determine the unknown limits of Asia. On February 4, 1725, he started from Saint Petersburg to cross Siberia, with orders to discover whether Asia and America are connected. After three years of preparation at Okhotsk and Kamchatka, he made a seven-weeks' voyage as far as a point from which he could see no land toward the north or east. This northeasterly point of Asia had already been visited by Simeon Deshneff, a Cossack voyager, in 1648. Bering went back to Saint Petersburg in the spring of 1730. A year later a vessel commanded by Michael Gvosdeff was driven from Cape Szerde Kamen by a storm across to the Alaska coast, along which Gvosdeff sailed for two days. The Empress Anne ordered Bering to carry out his previous instructions, and in the spring of 1733 he returned to Okhotsk. He delayed there until September, 1740, when he sailed to Petropavlovsk, where he stayed until June 15, 1741. He sailed eastward, and on July 26 his lieutenant, who had separated from the commander during a fog, reached the North American coast near Cross Bay. Bering made land north of Cape Saint Elias, July 29. When he started to return, he was driven about by storms until November 16, when his vessel was wrecked on the desert island still known by his name. He died there of exposure and disappointment, December 19, 1741. His companions built a vessel, in which they returned to Kamchatka with more than $100,000 worth of furs captured on the island. A life of Bering, by Lauridsen, was published in Chicago in 1890.

BERING IS′LAND. A somewhat isolated island west of the Aleutian group, in the northern Pacific, about latitude 55° N. and longitude 166° E. It is the place where the navigator, Bering, was wrecked in 1741. It is rocky and desolate; population composed of natives and seal-fishers.

BERING SEA, called also the Sea of Kamchatka. The extreme northern part of the Pacific Ocean, from which it is partly cut off by the Alaska Peninsula and the Aleutian Islands (Map: The World, West Hem., D 2). It is connected by Bering Strait with the Arctic Ocean, and extends from Alaska to the shores of Asia. It has a north and south extent of about 1000 miles, and an east and west extent of over 1500 miles. It receives from the Alaskan coast the waters of the Yukon River (q.v.). The islands are not numerous, the chief ones being the Pribylov, Nunivak, Saint Matthew, and Saint Lawrence. The northern half of the sea is shallow, with a depth of less than 600 feet (and much of it under 200 feet); but the southern half has a depth exceeding 10,000 feet.

BERING SEA CON′TROVERSY. An international dispute, in which Great Britain and the United States were the principal parties concerned, arising out of the depredations of unlicensed Canadian sealers on the seal-fisheries of the North Pacific.

The Pribylov Islands in the Bering Sea are the largest seal-rookery in the world. The seals congregate upon these islands for about eight months in the year, leaving for a day or two at a time to seek food in the surrounding waters within a radius of 50 or 100 miles. In the winter the entire herd scatters far to the south and west in the Pacific Ocean. For ninety years the seals had been preserved under the supervision of the Russian Government, and this was continued by the United States after the cession of Alaska in 1867, the business being leased to the North American Commercial Company and the slaughter carefully restricted to 100,000 seals annually. This represented in 1885 a capital of about $30,000,000, and, at a royalty of $10 per skin, yielded the Government a yearly revenue of $1,000,000. In 1886 a fleet of vessels was fitted out in British Columbia by Canadian and American capital to hunt seals while feeding in the water beyond the territorial three-mile limit. This business increased rapidly, until in 1893 there were about seventy craft engaged in it. The number of seals captured was estimated at 30,000, and the depredations on the herd necessitated the reduction of the licensed slaughter to 21,000. This pelagic sealing was especially destructive, because the majority of the animals killed were females.

Secretary Manning, of the Treasury Department, ruled that Bering Sea, to the western limit covered by the Russian cession, was *closed*, or under the exclusive jurisdiction of the United States, and seizures of Canadian schooners were made by the American patrols. This was followed by protests from Sir Sackville-West, then British Minister. Meanwhile, Secretary Bayard sent a circular letter to Great Britain, France, Germany, Japan, Russia, and Sweden, asking for coöperation to prevent destruction of the industry. Negotiations conducted between Great Britain and the United States resulted finally in the Blaine-Pauncefote Treaty of 1892, providing for an arbitration of the questions at issue. The Court of Arbitration, composed of Baron de Courcel (France), Marquis Emilio Visconti-Venosta (Italy), Judge Gregers W. W. Gram (Sweden and Norway), Lord Hannen (England), Sir John Thompson (Canada), and Justice John M. Harlan and Senator John T. Morgan (United States), met in Paris, March 23, 1893.

The United States based its case upon three grounds: First, a prescriptive right of territorial jurisdiction over the Bering Sea; second, a right of private property in the seals; third, the common interest of mankind in the preservation of the species and the prevention of its ultimate annihilation for temporary gain. On August 15 the tribunal rendered a decision mainly unfavorable to the American contention, to the effect that Russia did not assert or claim exclusive jurisdiction over Bering Sea or rights in seal-fisheries beyond the three-mile limit; that the body of water known as Bering Sea was included in the phrase 'Pacific Ocean' in the Treaty of 1825, by which Russia granted Great Britain commercial privileges in those waters; that the United States had no right to protection of property in seals frequenting the islands of the United States beyond the three-mile limit. But regulations were adopted establishing a close season from May 1 to July 31, forbidding pelagic sealing within 60 miles of the Pribylov group, and prohibiting the use of steam vessels or explosive weapons, and provided for licensing of the vessels and proper qualifications of the parties engaged in the business, these regulations to be enforced by the governments of the United States and Great Britain acting concurrently.

These restrictions proved ineffectual, and after much friction between the two powers a meeting of experts was arranged for November, 1897. The American offer to suspend seal-killing for a year meantime, provided the Canadian Government would prevent pelagic sealing, was refused, unless the Canadian vessels received compensation. Congress retaliated by prohibiting sealskin importation unless the skins were from the Pribylov Islands. The rapid depletion of the herd that had taken place was claimed by the British experts to be due to unscientific killing on the islands. Meanwhile, in accordance with the treaty of 1896, a commission in 1897 had assessed the damages to Canadian ship-owners by reason of American seizures at $473,151.26, which was accepted by Congress and was paid in the following year. The whole question was finally referred to the Anglo-American Commission, which had reached no conclusion upon its indefinite adjournment in February, 1899, because of the deaths of Lord Herschel and Mr. Dingley. All efforts to restrict the wholesale destruction of seals have thus far proved unavailing, and the species bids fair to be exterminated. Consult: Henderson, *American Diplomatic Questions* (New York, 1901); Snow, *Treaties and Topics in American Diplomacy* (Boston, 1894); and Stanton, *The Bering Sea Controversy* (New York, 1892).

BERING STRAIT. A water passage separating Asia from America, and connecting the Pacific with the Arctic Ocean (Map: America, North, B 3). It was first discovered and explored by a Cossack named Deshneff, in 1648; again explored by Bering in 1728; later by Cook and Beechey. The narrowest part is near latitude 66°, between East Cape in Asia and Cape Prince of Wales in America. The distance between the two capes, in a direction from northwest to southeast, is about 40 miles. About midway are three uninhabited islands. The greatest depth, from 150 to 250 feet, is toward the middle, the water being shallower toward the American coast than the Asiatic.

BER′INGTON, JOSEPH (1746-1827). An English Roman Catholic theologian. He is remembered for his *Faith of Catholics* (London, 1813; 3d ed., 1846; 3 vols.) and *Literary History of the Middle Ages* (1814; 3d ed., 1883).

BÉRIOT, bā′rē-ō′, CHARLES AUGUSTE DE (1802-70). A Belgian violinist and composer, born at Louvain. He was a precocious and original musician, remarkable for pure tone and refined taste. In 1836 he married the famous singer, Malibran. In 1842 he was made professor in the Conservatory of Music in Paris, and later in that of Brussels; but he resigned his position nine years after, in consequence of failing eyesight. He was the author of a complete manual for the violin, and of seven concertos, besides a great number of popular compositions for that instrument, all distinguished for noble sentiment, melodiousness, and brilliancy, showing great progress in the treatment of the instrument, as compared with his predecessors. By dint of his admirable technique and his eminence as a composer, he became the head of the Belgian school of violinists, which through him and his pupils, Vieuxtemps and Léonard, attained to well-deserved fame.

BERISLAV, bā′rē-släf, or **BORISLAV** (Russ., 'take glory,' referring to its capture from the Turks). A fortified town in the Russian Government of Kherson, on the right bank of the Dnieper, 46 miles northeast of Kherson (Map:

Russia, D 5). It is the centre of the grain-trade for the neighborhood. Berislav is supposed to have been founded in 1450 by the Turks, by whom it was called Kizi-Kermen. It was taken in 1696 by Peter the Great, and its name was later changed to Berislav. Population, in 1897, 12,000.

BERKELEY, bĕrk′lĭ *or* bärk′lĭ (AS. *Birce*, Ger. *Birke*, Engl. *birch* + *leāh*, Engl. *lea, ley*, district, meadow, field). A small town of Gloucestershire, England, 15 miles southwest of the town of Gloucester, on the Avon a mile and a half east of its junction with the estuary of the Severn (Map: England, D 5). It is situated in a fertile valley, which has long been noted for its dairies and manufactures of cheese. In Berkeley Castle, which contains an interesting collection of portraits and relics, Edward II. was murdered in 1327 by Maltravers and Gourney. Dr. Edward Jenner, the discoverer of vaccination, was a native of Berkeley. Population, in 1901, 6277.

BERKELEY, bĕrk′lĭ. A city in Alameda County, Cal., 5 miles north of Oakland, the county-seat; on the California and Nevada and the Southern Pacific railroads (Map: California, B 3). It has a fine location on heights overlooking San Francisco Bay and the Golden Gate, and is the seat of the University of California (q.v.), which has several notable buildings, and occupies 250 acres of beautiful grounds, of the State Agricultural and Mechanical College, of the Berkeley Bible Seminary (Disciples of Christ), and of the State Institution for the Deaf, Dumb, and Blind. It also contains the Boone University School, Bowen Academy, both non-sectarian; Head Preparatory School for Girls (Protestant Episcopal), and public and several school libraries. Berkeley, named after Bishop Berkeley, was settled in 1868, and was incorporated as a town in 1878. Population, in 1890, 5101; in 1900, 13,214.

BERKELEY, bĕrk′lĭ *or* bärk′lĭ, George (1685-1753). Bishop of Cloyne, a distinguished philosopher. He was born near Thomastown, county of Kilkenny, Ireland, and was the eldest son of William Berkeley, a cadet of the family of the Earl of Berkeley. As a boy he studied at Kilkenny School, at which Swift also received his early education, and in his fifteenth year he followed his great countryman to Trinity College, Dublin, where in 1707 he obtained a fellowship. At Trinity he enjoyed the society of Swift, who patronized him, as he did almost everybody, and who subsequently had a great deal to do in shaping his fortunes, while his philosophical views were formed upon the basis of Locke's.

Berkeley's career as an author began in 1707 (the year in which he obtained his fellowship) by the publication of a work written three years before, at the age of 19, entitled *Arithmetica absque Algebra aut Euclide Demonstrata*. This was followed in 1709 by the celebrated *Essay Towards a New Theory of Vision*, in which he propounded the doctrine of the ideal character of visual space. Locke had already championed the view of the subjective character of the secondary qualities (q.v.), but "solidity, extension, figure, motion, or rest, and number," the primary qualities, were for him ideas whose "patterns do really exist in the bodies themselves." Berkeley, in his *Essay*, left solidity and number unquestioned, but reduced the remaining primary qualities to subjectivity, making the distance of any object mean the succession of muscular feelings that must be experienced before a tactual sensation of that object can be obtained. Space as the form of outness is thus explained as nothing but a way of looking at time. In his *Treatise Concerning the Principles of Human Knowledge* (1710), Berkeley went much further with his idealism. He maintained that matter cannot be conceived to exist, the only possible substance being mind. The material world is nothing but a complex of sensations, which come and go with an 'order and coherence' that constitutes the laws of nature. This doctrine is epitomized in the sentence '*esse est percipi*,' i.e. 'being is to be perceived or known.' Berkeley's object was to undermine the materialism of the age by denying the reality of the external world. If there is no external world, he argued, the phenomena of sense can be explained only by supposing a deity continually necessitating perception. Common sense has tried to refute Berkeley by kicking a stone and pointing to the reality of the effect produced; but common sense does not realize that the effect is in that case evidently a sensation and an affection. Berkeley's rejection of abstract matter has been justified by subsequent philosophic thought, although the crudeness of his idealism is quite generally recognized. Especially unfortunate, from the philosophical point of view, was his dogmatism in assuming the existence of a God to give permanence to the fleeting sensations of human experience. The procedure was a vicious circle. He set out to prove the existence of a God, and then at last assumed that existence in order to make his philosophical view tenable. And history has avenged itself for this illogicality; for Hume, working in the same philosophical spirit, came to an opposite theological conclusion.

In the *Introduction* to the *Principles*, Berkeley broached a doctrine that has proved of revolutionary significance in modern philosophy, viz., that there are no abstract general ideas. To be sure, this thesis had been maintained by the Nominalists of the Middle Ages (see Nominalism), but Berkeley's statement of the position gave it its classical expression. "If any man has the faculty of framing in his mind such an idea of a triangle," as had been described by Locke, a triangle "neither oblique nor rectangular, neither equilateral, equicrural, nor scalenon, but all and none of these at once, it is in vain to pretend to dispute him out of it." But "I cannot by any effort of thought conceive the abstract idea above described." And since Berkeley's day more and more thinkers have confessed to a similar inability. See Abstraction.

In 1713 Berkeley went to reside in London, where in the same year he published a defense of his ideal system, *Three Dialogues Between Hylas and Philonoüs*, which is remarkable, as indeed all his writings are, for the clearness and beauty of the style. Shortly after this he was appointed chaplain and secretary of legation under Lord Peterborough, whom he accompanied to Italy; but his first stay there was short. In 1716 he went abroad again, to stay four years. Upon his return he wrote, in 1721, an *Essay Toward Preventing the Ruin of Great Britain*, which was called forth by the craze in connection with the South Sea scheme. In 1721 he returned to Ireland, and in 1724 he became Dean of Derry, with an income of £1500, and resigned his fellowship.

Berkeley was not a man to remain in the enjoyment of leisure and opulence. The Dean of Derry set to devising schemes of usefulness, fixing at last on one by which his deanery and income were to be exchanged for exile and £100 a year. This was the Bermuda College scheme for training pastors for the colonies and missionaries to the American Indians. Swift, failing to induce him to give up the project, made influence with ministers to support it, which they promised to do. Full of hope, Berkeley prepared for his exile. He married, in August, 1728, Anna, daughter of Right Hon. John Forster, Speaker of the Irish House of Commons, and soon after sailed for Rhode Island. In that State, not far from Newport, he wrote the larger part of *Alciphron; or, the Minute Philosopher* (1732), his favorite resort being a natural recess in the rocks on the seashore. In 1733 he published his *Theory of Visual Language Vindicated.* The support promised by the Government was never given to him, and after a few years he returned to England in 1732. In 1734 he received the bishopric of Cloyne, as a mark of favor from Queen Caroline. He was now once more in the enjoyment of leisure, of which he availed himself to write many works. In 1744 he gave the world his notions of the virtues of tar-water, and his revised philosophical ideas in a book entitled *Siris: A Chain of Philosophical Reflections,* etc. In this work he made an attempt to do philosophical justice to the element of permanence in experience; but it cannot be said that he succeeded in doing more than setting a problem for subsequent idealism. His last work was *Further Thoughts on Tar-Water,* published in 1752. The fact is, he was hypochondriacal for many years before his death. He died at Oxford, whither he had gone to live with his son, who was studying at Christ Church. A genial companion, an affectionate and steady friend, he was loved by all of his contemporaries who enjoyed his society; a graceful writer, a subtle philosopher, and an active churchman, his whole life was devoted to usefulness, and ennobled by the purity of his aspirations. The best edition of his works is that of Fraser (2d ed., Oxford, 1902), one volume of which is devoted to a life; consult also for a briefer biography Fraser, *Berkeley* (London, 1881), and for philosophical criticism Frederichs, *Ueber Berkeleys Idealismus* (Berlin, 1870); Spicker, *Kant, Hume und Berkeley* (Berlin, 1875); Janitsch, *Kants Urteil, über Berkeley* (Strassburg, 1879); Penjon, *Etudes sur la vie et les œuvres philosophiques de Berkeley* (Paris, 1878).

BERKELEY, Miles Joseph (1803-89). An English botanist. He was educated at Cambridge, and was subsequently a curate at Margate, and rural dean of Oundle and Welford. He wrote *British Algæ* (1833); the concluding volume of *English Flora;* articles on diseases of plants, and on vegetable pathology; an *Introduction to Cryptogamic Botany* (1857); and works on fungi, mosses, etc.

BERKELEY, Sir William (1610-77). A colonial governor of Virginia. He was born near London, and graduated at Oxford, in 1629. In 1641 he was commissioned Governor of Virginia, and during the Civil War in England kept that colony loyal to the King until 1651, when the adherents of Cromwell gained the ascendency, and made Richard Bennet Governor in Berkeley's place. He remained in the colony, however, and in 1660 was chosen Governor by the General Assembly. He soon completely lost favor with the people by his arbitrary policy, his obstinacy, and his persistent refusal to furnish protection against the Indians; and a rebellion against him led by Nathaniel Bacon (q.v.) failed only because of the sudden death of its leader. He was forced to resign the governorship, and in the same year returned to England. He was the author of *A Discourse and View of Virginia* (1663), and a drama called *The Lost Lady* (1639).

BERKELEY DIVIN'ITY SCHOOL. A Protestant Episcopal theological seminary. It was organized in 1849 by John Williams, fourth Bishop of Connecticut, and then president of Trinity College, Hartford, Conn., as a theological department of the College. Later, however, the seminary was put upon an independent basis, and removed to Middletown, Conn. The graduates of the seminary number many of the best-known ministers of the Episcopal Church. The value of the college buildings and grounds is about $90,000, and the endowment fund aggregates $350,000. Of late years the number of students has declined.

BERKELEY (bĕrk'lĭ) **SPRINGS.** A town and county-seat of Morgan County, W. Va., 100 miles northwest of Washington, D. C.; near the Potomac River and on a branch of the Baltimore and Ohio Railroad (Map: West Virginia, F 2). It is a popular resort, frequented for its warm (74° F.) mineral springs, which have medicinal properties, and contains Mount Wesley Academy and Gill Park. Among its industrial enterprises are planing and flouring mills, shovel-factory, etc. Berkeley Springs was settled as early as 1775, and was incorporated in 1872. Population, in 1900, 781.

BERKHAMPSTEAD, Great. See Great Berkhampstead.

BERK'LEY. A town in Norfolk County, Va., on the Elizabeth River, opposite Norfolk and Portsmouth, with which places it is connected by ferry, and on the Norfolk and Western and the Norfolk and Southern railroads (Map: Virginia, H 5). It contains the Berkley Collegiate and Military Institute and other private schools. The town is in a productive truck-farming region, and is the seat of a large trade in lumber and of extensive lumber-manufacturing interests. There are also shipyards, foundries, knitting-mills, fertilizer-works, etc. Population, in 1890, 3899; in 1900, 4988.

BERK'SHIRE (shorter *Berks,* the birches, AS. *birce, beorc,* birch). A midland county of England, bounded north by Gloucester, Oxford, and Bucks; east by Oxford and Bucks; southeast by Surrey; south by Hampshire, and west by Wiltshire (Map: England, E 5). Its area is 712 square miles, nearly one-half of which is under tillage, one-fourth in pasture, and one-sixteenth in forest. The population are chiefly engaged in stock-raising and agricultural pursuits. The capital is Reading. Population, in

1891. 238,700; in 1901, 255,000. Consult Graves, *The Way About Berkshire* (London, 1898).

BERKSHIRE HILLS. The name applied to the hill country of western Massachusetts (Map: Massachusetts, A 3). The region is famed for the beauty of its scenery and is a favorite outing-place in summer. The mountains, which are a continuation of the Green Mountains of Vermont, are intersected by rivers and valleys, which give variety to the scenery. The chief rivers on the west are the Hoosac and the Housatonic, and on the east the Deerfield and the Westfield. Few of the summits are over 2000 feet above sea-level; but Greylock in the north rises to 3535 feet, and Mount Everett at the south rises to 2635 feet.

BERLAD, bĕr-läd′. A town of Rumania, situated on the river of the same name and on the Tecuci-Bashii Railway. It is regularly built, and contains a number of institutions for secondary education and a theatre. It has also a considerable trade in grain and a number of distilleries. Population, in 1899, 24,484.

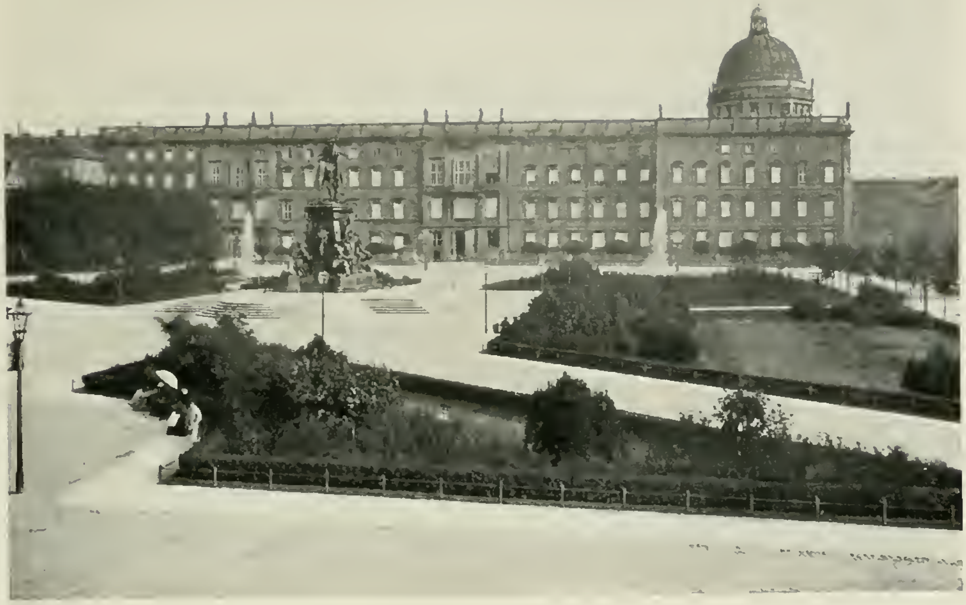
BERLEBURG, bĕr′l*e*-bo͞ork, or **BERLEBURGER** (bĕr′le-bo͞ork′ẽr) **BIBLE.** A translation of the Bible published by unknown editors at Berleburg, in Germany, 25 miles northwest of Marburg (1726-42, 8 vols.). It is an original translation, with a running exposition, giving the literal, spiritual, and hidden or mystical interpretation. It has the characteristic excellences and defects of pietism.

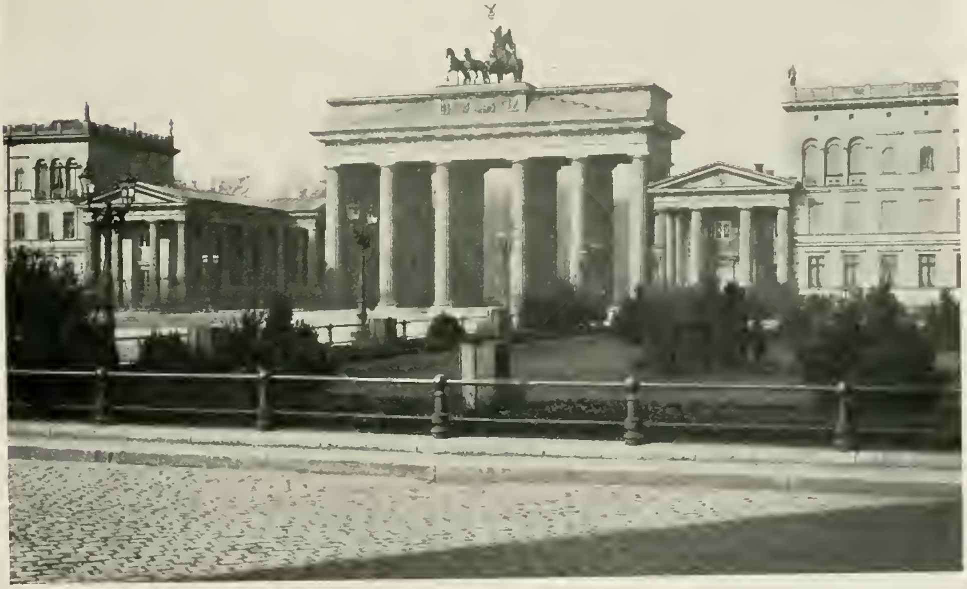
BERLICHINGEN, bĕr′lĭk-ĭng′en, GÖTZ or GOTTFRIED VON (1480-1562). A German feudal knight and soldier of fortune. He was born at Jagsthausen, Württemberg, and was initiated into feudal warfare at an early age. He first served the Elector Frederick of Brandenburg, but soon took up the cause of Albert of Bavaria. In 1504, at the siege of Landshut, he lost his right hand, and having had it replaced by an iron one, he was thenceforth known as Götz of the Iron Hand. He lived in constant feuds with his neighbors and waylaid passing merchants, varying these pastimes with deeds of chivalry. His disregard for the edict against private warfare caused Götz to be twice put under the ban of the Empire, first in 1512 and again in 1518. He was a stanch supporter of Luther. In 1525 the revolted peasants, according to his story, came to the castle of Berlichingen and insisted forcibly on his assuming command over them. The revolt was soon put down and Götz taken prisoner, and only released after two years' captivity, and on promise of abstaining from further warfare. After a long period of inactivity he reappeared on the scene in 1542, and took part in the campaign in Hungary against the Turks, and in 1544 fought for Charles V. against Francis I. Götz died at his castle, July 23, 1562. While living in retirement he wrote his famous autobiography, which first appeared in 1731 and has since been edited by Schönhuth (Heilbronn, 1859), and by Müller (Leipzig, 1882). Goethe chose the famous knight as the hero of one of his best-known dramas, *Götz von Berlichingen*, which Sir Walter Scott translated, and in the eyes of historians generally Götz represents the typical feudal knight. The best biographies of him are: Götz, Graf van Berlichingen-Rossach, *Geschichte des Ritters Götz von Berlichingen mit der eisernen Hand* (Leipzig, 1861); Buesching, *Leben des Götz von Berlichingen* (Berlin, 1810). The family of Berlichingen-Rossach are descendants of the famous knight.

BERLIN, bẽr-lĭn′ *or* bẽr′lĭn; *Ger. pron.* bĕr-lēn′ (commonly explained as a word of the Wendish Slavs, which meant 'free or open space'). The capital of the German Empire, of the Kingdom of Prussia, and of the Province of Brandenburg (Map: Prussia, E. 2). It is one of the finest and most important cities of Europe, the largest after London and Paris, and is situated on the river Spree, in latitude 52° 30′ N., longitude 13° 24′ E. The Spree, at this place about 200 feet wide, with a sluggish current, flows through the city in a northwesterly direction, dividing it into two nearly equal parts; and it is connected with the Oder and the Baltic by canals.

STREETS, BUILDINGS, AND MONUMENTS. The divisions of Berlin are marked by the course of the natural waterways intersecting the city. Three of the older parts of the city—viz., Old Kölln, with its royal castle; Old Berlin, with the city hall; and Friedrichswerder and New Kölln, with the Arsenal and State Bank—form the first circle around the centre which constituted the original city. Next follows a second concentric circle of seven parts, viz., Dorotheenstadt, Friedrichstadt, Friedrich-Wilhelmstadt, Königstadt, Spandauer Viertel, Stralauer Viertel, and Luisenstadt. A third circle is formed around the famous Thiergarten as a centre, and includes Moabit, Wedding, and the Oranienburg and Rosenthal suburbs on the north, and the Friedrich, Schöneberg, and Tempelhof suburbs on the south. Berlin is distinguished by a large number of imposing modern public edifices and by numerous splendid public monuments. Its most celebrated street is Unter den Linden (so called from its double avenue of linden-trees), one of the finest and most spacious streets in Europe. It is entered from the Thiergarten through the celebrated Brandenburg Gate, the only one of the city gates left since the demolition of the city walls, erected in 1789-93 by Langhans, in imitation of the Propylæa at Athens. It consists of a double portico of 12 Doric columns, forming five passageways for carriages, and is surmounted by a Quadriga of Victory. After Unter den Linden, the principal thoroughfares are the Friedrichstrasse, Leipziger Strasse, Potsdamer Strasse, Wilhelmstrasse, Königstrasse, and Kaiser-Wilhelmstrasse. Among the church edifices the new cathedral in Italian Renaissance, founded in 1894 on the site of the old cathedral, is the largest and most imposing. Its cost was 10,000,000 marks. The Gothic Klosterkirche, built by the Franciscans at the end of the Thirteenth Century, is one of the best preserved specimens of mediæval architecture. Of modern churches, the Kaiser Wilhelm Memorial Church, in late Romanesque, erected in 1891-95, with its main tower 370 feet high, is the loftiest structure in Berlin. Two other noteworthy ecclesiastical buildings are the Roman Catholic Church of Saint Michael, erected in 1853-56 as a garrison church, and the New Synagogue of Moorish architecture, built in 1859-66, with a seating capacity of 3000, and distinguished for its interior decorations.

The most notable secular building is the Royal Palace, during the reign of Frederick the Great, and since the accession of William II. the Im-





BERLIN

THE ROYAL PALACE (UPPER)

THE BRANDENBURG GATE (LOWER)

perial residence. It contains 600 rooms, of which the Old Throne-Room, with its gorgeous rococo decoration, the White Hall, the Palace Chapel adorned with frescoes, on a gold ground, and the Picture Gallery are the most beautiful. Opposite the palace is the Old Museum, a noble structure in Greek style, erected by Schinkel in 1824-28; in the rear and connected with it is the New Museum, in Renaissance style, built by Stüler in 1843-55. Next to this rises the National Gallery in the form of a Corinthian temple. The arsenal, a square structure in late Italian Renaissance, built in 1695-1706, is remarkable for the fine sculptures adorning its exterior, notably the famous heads of Dying Warriors, executed by Schlüter. In its vicinity are situated the Königswache (Royal Guardhouse), in the form of a Roman *castrum*, and the Academy of Architecture, both by Schinkel, the latter one of his most original creations. In its skillful blending of mediæval structural forms with Greek details, it makes a happy combination, which may also be observed in the Schauspielhaus (Royal Theatre) by the same architect. In the centre of the city the imposing Rathaus (City Hall) attracts attention, and among other structures of more recent date may be mentioned the Exchange, the Deutsche Reichsbank in Renaissance, with fine color effects due to the judicious combination of sandstone and brick; the handsomely adorned Anhalt Railway Station; and the new Reichstags-Gebäude, so far the foremost architectural achievement in Berlin.

The city is adorned throughout with numerous statues of military heroes, the equestrian statue of Frederick the Great, the master creation of Rauch, being the most remarkable. Next in importance is that of the Great Elector, an impressive work by Schlüter, and among more recent works are the equestrian statue of Frederick William III., by Wolff, and the imposing national monuments to Emperor William I. and to Prince Bismarck. Among the other public monuments the Column of Victory on the Königs Platz, commemorating the great victories in the campaigns of 1866 and 1870-71, is the most conspicuous. On the Schlossbrücke (palace-bridge), the handsomest of the 50 bridges in Berlin, the eight marble groups of heroic size, illustrative of a warrior's life, are worthy of notice; so are the five statues of Prussian generals, by Rauch, adorning the square before the Opera House, and the Luther Monument on the Neue Markt. Of art treasures the Old Museum contains besides the Gallery of Antiquities, including the Pergamenian Sculptures, an almost unequaled collection of sculptures of the Christian epoch, while its picture gallery is remarkable for its representative character, containing admirable specimens of almost every epoch and school of painting; the Cabinet of Coins is also remarkably varied and complete. In the New Museum there is a comprehensive and valuable collection of casts; of importance also are the Egyptian Museum in this building, scarcely equaled by any similar collection, the Cabinet of Engravings, and the Antiquarium. The upper wall of the superb staircase, which occupies the centre of the building, is adorned with the famous six mural paintings by Kaulbach, representing the chief episodes in the history of mankind. The National Gallery contains over 700 paintings and more than 100 sculptures by modern German artists. Other collections of interest are found in the Ethnological and Art Industrial Museums; in the Ravené Picture Gallery, containing a series of choice works by modern French and German masters, and in the Hohenzollern Museum.

The educational institutions of Berlin are numerous and of a high order. Among the higher institutions of learning, in addition to the University of Berlin (see article), are the Academy of Architecture, with nearly 2000 students and over 300 teachers, the Royal Academy of Mining Engineering, the Military Academy, the Artillery and Engineering School, the Royal School of Agriculture, the Royal Academy of Arts, the Veterinary School, Royal School of Music, School of Oriental Languages, etc.

Industry and Commerce. Of first importance are the cloth-printing and dyeing establishments, the iron and steel industry, and the manufacture of clothing, especially women's cloaks. In addition to these, railway cars and wagons, sewing-machines, dynamos and all kinds of electrical apparatus, gold, silver, and bronze wares, pianos, musical instruments, toys, carpets, porcelain and earthen ware, beer, and nearly every article of domestic and industrial use are produced in Berlin's busy factories. In 1888 the capital stock of all companies doing business in Berlin was 655 million marks; in 1897 it was nearly 1100 million, with an output of nearly double that amount. The principal industries were building (65,000,600 marks); electrical (67,000,000 marks); brewing (54,000,000 marks); machinery and metals (70,000,000 marks). There were nearly 5000 factories of all kinds in 1897, employing 175,000 persons. The geographical position of Berlin makes it the natural emporium for the agricultural products coming from East Prussia, Austria, and Russia. It is the centre of the North German railway system, twelve railway lines passing through the city. The chief articles of commerce are grain, cattle, wool, timber, and coal. Nearly 35,000 freight steamers enter the city annually by way of the Spree, bringing more than 5,000,000 tons of all kinds of merchandise.

Government and Administration. In the administrative system of Berlin, the municipal council, composed of 126 members, is elected for a term of six years; to insure continuity and stability in the council, one-third of its seats are vacated and filled every two years. The council elects the mayor (burgomaster) and his immediate advisers, and is in general the source of governmental authority for the municipality except in those branches of administration which are under the direct control of the National Government. (For further details see Prussia, *Local Government.*) The police organization is under the control of the Minister of the Interior, and is subdivided into six departments, as follows: General police; factory inspection; building inspection; criminal police; passport and labor bureau; market and mounted police. The total force amounts to 4200 men, or about 25 men to each 10,000 inhabitants, which constitutes a favorable comparison with 28 in Paris, 24 in London, and 20 in New York, to the same number of inhabitants.

The steady growth of the city and the increasing number of functions performed by the municipality have led to an increased city budget, which amounted to more than $20,000,000 in 1893-94, and to over $25,000,000 in 1900, not including the income and expenditure of various city works, amounting to over $12,000,000. The department requiring the largest expenditure is the building department, over $4,500,000; the board of education spends about $3,500,000, whereas the police department requires about $1,500,000, and the board of health about $1,250,000. The total debt of the city amounted to 256,000,000 marks in 1893, and exceeded 287,000,000 in 1900. The numerous city improvements offset these items of expense and indebtedness. There is an extensive system of asphalt pavements, which have been continually increasing for the last 20 years. Two abattoirs erected in Berlin in 1883 at a cost of $5,000,000 have supplanted about a thousand private slaughter-houses, and make it possible to enforce every regulation for health under a very efficient and cheap service. The civic waterworks yield a net income of 2,500,000 marks per year (in addition to supplying what is used for public needs), after defraying all the costs of operation and providing for the extinction of the debt incurred in erecting the plant. The sewerage system is on the most modern hygienic plan, all the city sewage being conducted, by means of a comprehensive system of sewers, to a sewage farm of about 30 square miles in extent, a few miles away. It required an outlay of $30,000,000 to perfect the system and buy the necessary land; but the city is already utilizing the farm to great advantage by raising thereon all kinds of vegetables, fruits, and cereals, and the accruing proceeds in time will not only cover the entire cost of maintenance, but also pay off the original outlay. Berlin has a perfect system of street-cleaning. It is thoroughly organized under municipal control, and costs the city less than half a million dollars a year. Berlin owns its gas plant. Though not owning its street-car system, which will become the property of the city at the expiration of the charter of the company in 1911, Berlin receives an annual sum from the company exceeding 1,000,000 marks. Its system of municipal market-halls recently introduced is a worthy supplement to the other municipal institutions which enable the city officials to enforce strictly all the sanitary measures and protect the poor against impure food and extortionate prices. A comprehensive system of parks and squares, some eighty in number, provides breathing-space for the most crowded portions of the city.

The rapid growth of the city's population, resulting in a great rise of real-estate values, led to great overcrowding of the poorer classes of the population in large tenements. Many of them were forced to live in cellars, which previous to the reforms mentioned below were damp and shut off from light. As a result there was an extremely high death-rate, varying in different parts of the city with the nature of the dwellings. In 1873 the rate was 28 per 1000, and it continued to grow. In 1885 an exhaustive statistical investigation was made, with a view to establishing the connection between the death-rate and the number of rooms occupied by a family. The results were startling, showing an extraordinary increase of the death-rate with the crowding into inhumanly narrow quarters. This caused the municipality to adopt a new stringent code of building regulations in 1888, which has been instrumental in greatly improving the condition of the Berlin tenements, and diminishing the death-rate, as seen from the following statistics of mortality: 1885, 29.98 per 1000; 1890, 27.55; 1892, 26.06; 1897, 18.61; 1898, 18.16.

A system of municipal lodging-houses enables the authorities at once to control the floating homeless population of the city and to provide sanitary and cheap lodgings for the needy. The poor-relief service is complete and thoroughly organized under municipal control. Berlin is divided for that purpose into 250 districts, with as many local committees to take charge of the work. In addition to the salaried officers, between two and three thousand citizens, receiving no salary, are engaged in the work. In 1898 Berlin spent over 10,000,000 marks on poor-relief, not counting the expenditure of about 5,500,000 marks on hospitals free to the poor.

The population of the city has increased with great rapidity. From 202,000 in 1820, it grew to 411,000 in 1849, to 826,000 in 1871, 1,579,000 in 1890, and 1,901,567 in 1901.

The origin of Berlin dates back to the early part of the Twelfth Century, when a small fishing-village, inhabited by Wends, arose at a ford across the Spree, between the old settlements of Spandau and Kopenick. Near by there sprang up in the same period the village of Kölln, and the two places prospered side by side. Early in the Thirteenth Century, Berlin acquired municipal rights, and in the beginning of the Fifteenth Century it was one of the leading cities of the Middle Mark of Brandenburg, possessing extensive trading privileges, an independent mint, and its own courts of justice. From the close of the Fifteenth Century it was permanently the residence of the Margraves of Brandenburg. The introduction of the Reformed religion (1539) was the cause of many civil tumults, and the Thirty Years' War, in the course of which Berlin was besieged by the Swedes and the Imperialists, destroyed the growth of the town. Its population declined from 12,000 at the beginning of the war to 6000 at the end, and its trade was practically brought to a standstill. The town received new life from the Great Elector, Frederick William (1640-88), who rebuilt the deserted places, laid out suburbs, and surrounded the town with strong fortifications. By the construction of a canal from the Spree to the Oder, he made Berlin an important centre of foreign commerce and ship-building, and he laid the foundation of its industrial prosperity by encouraging the settlement of immigrants from other countries, and especially of Huguenot refugees from France. The work of extending and beautifying the city was carried on by Frederick I., the first King of Prussia, and his successors. In 1709 Kölln, together with three suburbs, was united to Berlin. Under the patronage of Frederick the Great large manufactures of silk and cotton grew up, and toward the end of the Eighteenth Century, Berlin, from a garrison town and royal residence, had become rather an industrial centre. Its growth continued steady in spite of its occupation by the Austrians in 1757, the Russians in 1760, and the French from 1806 to 1808. Under Frederick William III. and Frederick William IV. the limits of the city were extended, many public

BERLIN

UNTER DEN LINDEN (UPPER)
THE NATIONAL GALLERY (LOWER)

buildings erected, and numerous public institutions founded, chief among them the University of Berlin (1809). The last quarter of the Nineteenth Century was a period of tremendous growth in wealth and population, due in part to the great industrial development of the city, and in part to its position as the capital of the new and powerful German Empire.

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BERLIN, bẽr′lĭn. A city in Coos County, N. H., on the Androscoggin River, and on the Grand Trunk and the Boston and Maine railroads (Map: New Hampshire, K 4). It has an attractive situation, 16 miles from the base of Mount Washington, is surrounded by rugged mountains, and possesses valuable water-power, the river here having a fall of 400 feet in six miles. Berlin has a public library, good water and sewerage systems, and is lighted by electricity. The leading manufactures include pulp, the sulphite pulp-mill being considered the largest in the country, paper, lumber in various products, and shoes. Fully $8,000,000 of capital is invested in these industries, employing nearly 3000 persons, with an annual production worth nearly $6,000,000. Population, in 1890, 3729; in 1900, 8886.

BERLIN. A city in Green Lake County, Wis., 96 miles northwest of Milwaukee; on the Fox River, and on the Chicago, Milwaukee and Saint Paul Railroad (Map: Wisconsin, E 5). It has granite quarries, dairy and cranberry interests, and manufactories of brooms, washboards, gloves, mittens, fur coats, shoes, bricks, and dairy, creamery, and apiary supplies. Settled in 1847, Berlin was first incorporated in 1856. It is now governed under a charter adopted in 1887, which provides for a mayor, elected biennially, and a city council. The water-works are owned and operated by the municipality. Population, in 1890, 4149; in 1900, 4489.

BERLIN. An old-fashioned four-wheeled covered carriage, with a suspended body, seating two persons, having a seat behind covered with a hood. It owes its name to the fact that it was first made about the year 1670 in Berlin, Prussia, from designs furnished by the architect of the Elector of Brandenburg.

BERLIN, CONGRESS OF. The European diplomatic conference which met at Berlin, June 13, 1878, to settle the Eastern Question (q.v.), and especially those phases of it which grew out of the Russo-Turkish War (q.v.). Temporarily restrained by the Crimean War and the Treaty of Paris of 1856, Russia had resumed, after the downfall of Napoleon III., her historic policy of intervention in the affairs of the Turkish Empire for the purpose of reaching the Mediterranean. The result was the Russo-Turkish War of 1877-78. The overwhelming success of Russia's armies filled with consternation the rivals of that empire, and especially Austria-Hungary and Great Britain, with their interests in the Balkan States and the eastern Mediterranean respectively. When Russia wrung from the Porte the Treaty of San Stefano, Great Britain and Austria united in declaring it unsatisfactory, and in demanding a European congress to revise its provisions. Germany had hitherto kept out of the Eastern imbroglio, but her Chancellor, Prince Bismarck, now came forward with an invitation to the Powers to hold the Congress in Berlin. The meetings were held at the Radziwill Palace, Bismarck's residence, and under his presidency. The delegates from Great Britain were Lord Beaconsfield, Lord Salisbury, and Lord Russell; from Russia, Prince Gortchakoff, Count Shuvaloff, and Baron d'Oubril; from Germany, Prince Bismarck, Prince Hohenlohe, and General von Bülow; from Austria-Hungary, Count Andrássy, Count Károlyi, and Baron Haymerle; from France, M. Waddington and the Comte de Saint Vallier; from Italy, Counts Corti and de Launay; and from Turkey, Karatheodori Pasha, Sadoullah Bey, and Mehemet Ali Pasha. Delegates from Greece, Rumania, Servia and Montenegro attended the sessions in which their States were concerned, but were not members of the Congress. Russia had been compelled to concede that the whole of the San Stefano Treaty should be taken up for consideration, and the Congress revised or eliminated eighteen of its twenty-nine articles—all that had any political significance—and effected a rearrangement of the Eastern situation, using as a foundation the treaties of Paris (1856) and of London (1871). It reaffirmed the principle that the status of the Turkish Empire was to be decided by the Powers jointly, and not by any one of them. The provisions of the earlier treaties that were retained related to commercial questions. On the political side, a new procedure was adopted, reaffirming emphatically the principle of nationality so far as the Balkan peoples were concerned. Rumania, Servia, and Montenegro were declared independent principalities. The tributary principality of Bulgaria and the autonomous province of Eastern Rumelia were carved out of the Turkish territory.

The first twelve articles related to Bulgaria (q.v.), which Russia had sought at San Stefano to erect into a State reaching from the Danube to the Ægean. The Congress greatly reduced the area of the new State, but granted to Bulgaria autonomy and guarantees against Turkish oppression. The next ten articles concerned Eastern Rumelia, a part of the proposed Greater Bulgaria. This was made a Turkish province, to be ruled by a Christian governor, but it soon took its destiny into its own hands and effected a union with Bulgaria. By Articles XXIII. and XXIV. the Porte agreed "scrupulously to apply in the island of Crete the Organic Law of 1868, with such modifications as may be considered equitable," and to rectify the Greek boundary. Article XXV. placed Bosnia and Herzegovina under the administration of Austria-Hungary, although they remained under Turkish sovereignty. The independence, delimitation, and external relations of Montenegro were treated in 7 articles; 8 were taken up by a similar adjustment for Servia, and 9 for Rumania. The Dobrudja was given to Rumania; Servia received large accessions of territory (including Nish); Montenegro obtained Niksitch, Podgoritza, and Antivari. It was provided that the five fortresses in Bulgaria which had been the bulwark of Turkey against Russia—Shumla, Varna, Silistria, Rustchuk, and Viddin—should be dismantled. The Danube below the Iron Gate was neutralized, and Rumania was given a place upon the Danube Commission, which had been instituted in 1856. The Congress allowed Russia to retain most of her conquests in Turkish Armenia—including Kars and Ardahan—as well as Batum, and reinstated her in the possession of the strip of Bessarabia which had been taken from her at the close of the Crimean War. It had been recognized that Russia would probably not yield the fruits of conquest in Asia, and on June 4, 1878, Great Britain had entered into a defensive alliance with Turkey, to take effect if Russia retained Batum, Ardahan, or Kars. Under this treaty Great Britain holds Cyprus for Turkey as a guarantee against further aggression by Russia in Asia. The fact of the practical acquisition of Cyprus by Great Britain, and of Bosnia and Herzegovina by Austria-Hungary, while Russia was robbed of the fruits of her victory, has been a source of international bitterness not without effect on political relations since 1878. The remaining articles of the Treaty of Berlin imposed certain obligations upon the Porte, such as the guaranteeing of civil rights to non-Mohammedan subjects, and provided for sundry evacuations, confirmations, and ratifications. Russia opposed as strenuously as possible the course taken by the powers at Berlin, but to no avail. Bismarck and Germany were accused of having abandoned their traditional friendship for Russia.

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BERLIN, Rudolf (1833-97). A German oculist, born at Friedland (Mecklenburg-Strelitz). He studied at Göttingen, Berlin, and other universities, was connected as an instructor with the University of Tübingen and the Technical Institute of Stuttgart, and in 1889 was appointed professor of ophthalmology at the University of Rostock. The results of his investigations concerning the presence of foreign bodies in the vitreous humor, the anatomy and pathology of the lachrymal gland, and other subjects, appeared in technical journals. He was among the first to make a systematic comparative study of diseases of the eye, and in 1882 established a *Zeitschrift für vergleichende Augenheilkunde*.

BERLIN, University of. One of the most important universities of the world, and also one of the youngest. After the disasters of 1806 and 1807 in the war with Napoleon, King Frederick William III., in September, 1807, established in Berlin an academy or university, to which he called many of the most noted of German scholars, including some who had been connected with the University of Halle, suppressed by Napoleon. The brilliant success of the new university was chiefly due to Wilhelm von Humboldt (elder brother of Alexander von Humboldt), a scholar, statesman, and administrator. As first Minister of Education in 1808, he brought the direction and support of the university into the hands of the Ministry of the Interior, and greatly enlarged its scope, and in 1809 the King, by royal order, finally established the university on its present basis. The chief feature of the new organization was the stress laid on securing men of the first order of ability to fill the professional chairs. A yearly income of 150,000 thalers and the royal palace of Prince Henry were assigned to the foundation, and the university began its brilliant career. Its faculties comprise theology, jurisprudence, medicine, and philosophy (arts and science). It had in 1901 more than 11,000 students, of whom 6160 were matriculated. These were divided as follows: Theology, 282; jurisprudence, 1498; medicine, 1067; philosophy (philosophy proper, philology, and history), 995; mathematics and science, 818; finance and administration, 141; pharmacy and dentistry, 304. The university also includes several 'institutions,' comprising the seminars, the institutes of physics and physiology, clinics, museums, and observatories. The university is supported by the State, and is under control of the Minister of Education. The administration is in the hands of the rector and senate, the so-called 'plenum' or full body of professors, and the faculties. A full account of the organization may be found in the article University, section *German*, etc. Here it is enough to say that the university is practically a self-governing body, with corporate freedom and responsibilities. It has police and judicial powers over its members, exercised by the administration and a university court. Men of all nationalities are admitted, and women (not German) to certain lectures under some restrictions. The choice of professors for distinguished excellence is still maintained, and the long list of great scholars connected with the university includes among others the Grimm brothers, Hegel, Scherer, Bopp, Ranke, Niebuhr, Savigny, Lepsius, Karl Ritter, Dove, Gneist, Trendelenburg, Helmholtz, and many more still on the roll of active teachers. The University Library consists of over 160,000 volumes and more than that number of university and school 'theses,' etc. The chief library facilities for students are to be found, however, in the Royal Library, which contains over 1,000,000 volumes and 30,000 MSS., including a collection of over 13,000 Oriental MSS. The libraries of the Reichstag (100,000 volumes), of the Royal War Academy (90,000 volumes), of the Royal Wilhelm's Academy (60,000), and the Royal Prussian and Royal Secret Archives, and other collections, are accessible.

BERLIN BLUE. See Hydro-ferrocyanic Acid.

BERLIN DECREE′. See Continental System.

BERLIN′ER, *Ger. pron.* bĕr-lē′nĕr, Emile (1851—). A German-American inventor, born in Hanover. He studied in Wolfenbüttel, came to the United States in 1870, and in 1879-82 was chief instrument inspector of the Bell Telephone Company. In 1877 he invented the telephone transmitter, or microphone, known by his name, and constructed on principles independently arrived at by Hughes in England in the same year.

He also invented other telephonic devices and the musical mechanism known as the gramophone.

BERLIN PHIL'HARMON'IC. See PHILHARMONIC SOCIETIES.

BERLIN SPIR'IT. A coarse whisky made chiefly from beet-root, potatoes, etc. Because of its cheapness it is sometimes used in the making of brandy, but is considered very unwholesome. See DISTILLATION; and DISTILLED LIQUORS.

BERLIOZ, bâr'lê-ôs', HECTOR (1803-69). A French composer. He was born at La Côte-Saint-André, December 11, 1803. His father, a physician, sent him to Paris to study medicine; but he entered the Conservatoire, which he soon left, finding the teaching too pedantic. He gave himself up heart and soul to the romantic movement, and became the champion of 'programme music'—which endeavors to tell a story in music. Of his earlier attempts in this line, the *Symphonie fantastique, épisode de la vie d'un artiste* (1828), a page of musical autobiography, is the most remarkable. Coveting the Prix de Rome, he resumed study in the Conservatoire under Lesueur (q.v.), and gained the prize with the cantata *Sardanapale* (1830). Life in Italy furnished inspiration for a new unfolding of his gifts, and he wrote the overture to *King Lear.* He now took up journalistic work in the *Correspondant,* then in the *Courrier de l'Europe,* in the *Revue Européenne,* and finally in the *Gazette musicale de Paris* and the *Journal des Débats.* His brilliant and powerful style, iconoclastic tendencies, and unswerving honesty and candor, made him the principal figure in French musical life. Though made conservator in 1839, and librarian in 1852, he never became professor at the Conservatory. His symphony, *Harold en Italie* (1834), his *Messe des morts* (1837), his *Carnaval romain* (overture), and the dramatic symphony, *Roméo et Juliette* (1839), all elicited high praise from the critics; but his first opera in two acts, *Benvenuto Cellini* (1838), was a failure. Early in the forties, encouraged by Liszt's propagation of his music, Berlioz undertook a tour of Germany, which was so successful that for some ten years he traveled through Austria, Hungary, Bohemia, Russia, and England, everywhere meeting with enthusiastic receptions. In Hungary, the "Rákóczy March," from his *Damnation de Faust* (1846), is said to have aroused the people to a patriotic frenzy. In London he conducted the New Philharmonic Concerts, and in 1853 his own *Benvenuto Cellini* at Covent Garden. He was elected to the Academy in 1856. His masterpiece, *Les Troyens,* consisting of *La Prise de Troie* (three acts) and *Les Troyens à Carthage* (five acts), proved a failure (Paris, 1863), which broke down the composer, and he was feeble throughout the rest of his life. In 1890 *Les Troyens* was produced in Karlsruhe, in 1899 in Moscow, and in 1900 in Paris, with signal success. His writings on musical matters and the art of music are among the most treasured works in this line. His *Traité d'instrumentation* was the theoretical exposition of his views on instrumentation, which he applied in practice, and until the last years of the century was the best work of its kind. In France he was appreciated more fully for his literary compositions, which moulded musical tastes and created a field for the great masters of music. Only after his death his compatriots came to think that he had not received his due honor, and they tried to make amends, which brought upon them the accusation of desiring to form a Berlioz cult. Berlioz lacked one essential—melodic invention—and all his ingenuity and art could not conceal the poverty of his musical ideas. But he was a great master in all else. His grandiose fancy conceived images that are often sublime. He possessed an accurate knowledge of the possibilities of every instrument, which enabled him to produce new and wonderful combinations, enchanting, dazzling, weird, bizarre, or elf-like (as e.g. the "Queen Mab Scherzo" in *Roméo et Juliette,* or in the *Danse des Sylphes*), and he is now the acknowledged father of modern orchestration. Without Berlioz, Wagner would have been an impossibility, although Berlioz turned away from Wagner. He died in Paris, March 8, 1869. His collected writings appeared in German translation, by R. Pohl, in 4 vols. (1864). Consult: Julien, *H. Berlioz* (Paris, 1888), very good; Hippeau, *Berlioz, l'homme et l'artiste* (Paris, 1883-85) and *Berlioz et son temps* (Paris, 1892); Pohl, *H. Berlioz: Studien und Erinnerungen* (Leipzig, 1884); and the autobiography, *Mémoires* (Paris, 1870; English translation, Rachel and Eleanor Holmes, London, 1884).

BERM, bẽrm (Fr. *berme,* probably of Germanic origin; cf. Ger. *Brame,* border, Engl. *brim*). In fortification, a ledge or pathway constructed at the bottom of the exterior of the outwork or rampart, where it joins the scarp or inner side of the ditch. It is from 3 to 8 feet in width, and is almost on a level with the natural surface of the ground. Besides serving as a passageway for troops manning the defenses, it serves in part to prevent the filling up of the ditch with earth and débris, when the rampart is battered by the besiegers. See FORTIFICATION.

BERMEJO, bâr-mā'Hō. A river of South America which rises in the south of Bolivia and flows through Argentina toward the Paraguay, which it joins a short distance above its junction with the Paraná (Map: Argentina, E 9). Its total length, including windings, is nearly 1300 miles, and it is navigable in its middle course for over half this distance for small steamers at all seasons, and for heavier craft for only about six months of the year. Since the middle of the last century the waters of the Bermejo have in their middle course mainly flowed through the parallel channel—the Rio Tenco—about 10 miles south of the old channel.

BERMONDSEY, bẽr'mond-zĭ (AS. *Beormondsig,* Beormond's island). A district of Greater London.

BERMONDSEY SPA (spä) **GAR'DENS.** A fashionable resort near London in George II.'s reign. The whole district is now crowded with the poor, chiefly tanners.

BERMU'DA (named after their discoverer), or **SOMERS** (sŭm'ẽrz) **ISLANDS.** A group of small islands and reefs in the Atlantic belonging to Great Britain, and situated in latitude 32° 14′ N. and longitude 64° 40′ W., about 750 miles southeast of New York, and about 600 miles east-southeast of Cape Hatteras, North Carolina (Map: America, North, M 6). It lies on the route from Europe to the West Indies, and derives additional importance from its position midway between the West Indies and the British possessions in North America. The group, including the uninhabited islets and reefs, numbers about 300 islands, of which, however, only about 20 are inhabited. The total area of the group is about 12,000 acres, of which Saint George, Bermuda, Somerset, and Ireland occupy the larger part. The islands are of coralline formation, composed mostly of white limestone, and are surrounded by numerous reefs, which make navigation dangerous. The highest point of land is 260 feet. There are no streams, and the fresh water supply is dependent on rains. Beautiful scenery, luxuriant vegetation, and other varied attractions, combined with a healthful and equable climate, make the islands favorite summer and winter resorts with Americans. During the winter the temperature ranges from about 50° in the morning to about 70° at midday. In the summer 87° is about the maximum. Frosts are unknown, and the ocean winds are tempered by the Gulf Stream. The soil is of remarkable fertility, and the climate is very favorable to vegetation. The chief products are sweet potatoes, onions, bananas, arrowroot, and some corn. The agricultural products go mostly to the United States and Canada, and the value of annual exports averages about $500,000. The islands produce also large quantities of lily-bulbs, which are shipped to the United States, where they are kept in hothouses until Easter.

The group is regarded as of considerable strategical importance, and is strongly fortified. It is the winter naval station for the British North Atlantic and West Indian squadron, and has a garrison of over 2500 men. The chief centre of population is Hamilton, on Bermuda, with about 2000 inhabitants. The extensive naval establishment, dockyards, and floating dock are on Ireland Island. Saint George has lost its commercial importance. The administration of the group is in the hands of a governor, who is assisted by two councils, appointed by the Crown, and by an assembly of 36 elected members. The total population of the group is about 16,300 (not counting the military), and includes about 6300 whites. The Bermudas were discovered by the Spaniard Juan Bermudez, in 1522, and were first settled by Sir George Somers, in 1609. They were colonized chiefly from Virginia, and received additional immigrants from the United States during the Civil War.

Bibliography. Newton, *Glimpses of Life in Bermuda* (London, 1897); Heilprin, *Bermuda Islands* (Philadelphia, 1889); Stark, *Bermuda Guide* (Boston, 1897); Cole, *Bermuda in Periodical Literature: A Bibliography* (Boston, 1898); Bell, *Beautiful Bermuda* (New York and Bermuda, 1902).

BERMUDA CE′DAR. See Juniper.

BERMUDA GRASS (so called by reason of its southern origin; cf. its other name, Bahama grass), *Cynodon dactylon* or *Capriola dactylon*. A perennial grass, probably a native of India, which has become introduced throughout the warmer portions of the globe. It is a low, creeping plant, rooting at the joints. In poor soils the leaves are short, and it sends up short flower-stalks, which divide into from three to seven slender divergent spikes. In good soil it is often 1 to 2 feet high. The rootstocks run everywhere, soon making a dense sod. It is insensible to heat and drought, on which account it is highly thought of in warm regions for grazing, since it remains green after all other species are dry. It grows readily on sandy soils, and is valuable in the Southern States as a lawn-grass. The plant is quite sensitive to cold, turning brown with the first frosts, although it is hardy in the latitude of Philadelphia. Its rooting habit makes it very difficult of eradication when once established. Bermuda grass will grow in almost any soil, unless too wet, but does not stand shade. It does not mature its seed in the United States, except in the extreme Southern States.

BERMUDA HUN′DRED. A peninsula in Chesterfield County, Va., formed by the confluence of the James and the Appomattox rivers. The population of the district of this name was 2044 in 1890 and 2105 in 1900. Bermuda Hundred was the scene of much sharp fighting during the Civil War. General Butler landed here with a Federal force of about 35,000 (the 'Army of the James') early in May, 1864, in order to cooperate with Grant against the Confederate Army of Northern Virginia under General Lee. He was confronted by General Beauregard, however, with an almost equal force, and on May 16 fought with him the battle of Drury's Bluff, in which the Federal loss was about 4000 and the Confederate about 3000. Though no other engagement of any consequence occurred in this vicinity, there was almost continual skirmishing until the 30th. Meanwhile, Butler sent part of his troops to reinforce Grant, and was himself kept closely confined at Bermuda Hundred. For an account of the battle of Drury's Bluff, consult Johnson and Buel (ed.), *Battles and Leaders of the Civil War*, Vol. IV. (New York, 1887).

BERN, bĕrn, *Ger. pron.* bĕrn (according to local tradition, many bears, Ger. *Bären*, were killed on the day of the foundation of the city). The capital of the canton of the same name and Federal capital of Switzerland since 1848, situated on a lofty sandstone promontory more than 1700 feet above the sea, formed by the winding Aar, 80 miles northeast of Geneva (Map: Switzerland, B 2). The river surrounds it on three sides, and is crossed by two stone bridges, one of which is a magnificent structure, upward of 900 feet long, with a central arch 150 feet wide and 93 feet high. The fourth side was defended by fortifications, but these have been converted into public walks. Bern has an imposing appearance from a distance, and a nearer view discloses one of the best and most regularly built towns in Europe, and the finest city in Switzerland. The houses are massive structures of freestone, resting upon shop-lined arcades, which furnish covered walks on both sides of the street. Rills of water flow through the streets, which are also adorned with numerous fountains. There are many fine public promenades in the environs, and the view of the Alpine peaks from the city is magnificent. The cathedral terrace, supported by walls 100 feet high, is planted with trees, and has a statue of the city's founder, Berthold von Zähringen. Among the principal public buildings are a Gothic cathedral, founded in 1421, with some interesting tablets and relics, fine stained windows, and a tower over 300 feet high, completed in 1894; the theatre; the natural history and art museums; the city library of over 100,000 volumes; the Bundeshäuser, or Federal Buildings, two palatial edifices in Florentine architecture, recently connected by the Swiss National Library, a magnificent domed structure, designed to accommodate the archives of the Swiss Diet and administration; the mint; the hospital, and the university. (For details as to the latter, see BERN, UNIVERSITY OF.) There are various scientific, musical, and social societies, hospitals, and benevolent institutions. The problem of dwellings for the laboring class also receives attention, and the city is in the van of this movement. The city gets water for its drinking supply, and for the motive power of its electric plants, by means of a dam 1000 feet long across the Aar. Its chief manufactures are woolens, silks, and cotton goods, scientific instruments, machinery, chocolate, etc. It has two great annual fairs and a large cattle and horse market. There are street railroads with compressed air and electricity as motive power. Steam roads run to the suburbs. The streets are lighted by electricity. Population, in 1900, 63,300.

The Franks subdued the present Canton of Bern in the early part of the Sixth Century. The region became part of the kingdom of Trans-Jurane Burgundy in 888, afterwards formed part of the kingdom of Arles, and about 1034 was united with the German Empire. In 1191 Berthold V., Duke of Zähringen, founded the town of Bern, and upon his demise without issue in 1218, it attained the position of a free imperial city. From the beginning the inhabitants of the city showed themselves bold in the defense of their rights and the extension of their power. They fought against the Hapsburgs and the Burgundians, and in 1339 succeeded in finally establishing their ascendency by defeating the rival town of Freiburg. By conquest and purchase the burghers of Bern increased their possessions until, at the height of its power, toward the end of the Sixteenth Century, Bern ruled over one-third of the present territory of Switzerland and held the leading place in the Swiss Confederacy, which it had joined in 1353. The government of the town from early times was democratic in character, with the legislative and executive authority vested in councils elected by the burghers; but about the middle of the Sixteenth Century a decided tendency toward aristocratic domination set in: the right of citizenship was restricted, and the power of the State finally came to rest with a small number of wealthy families and the privileged guilds. Toward the rural districts which it ruled the town adopted a policy of consistent selfishness. It refused them all political rights and repressed insurrections among its disaffected subjects with great cruelty. The invasion of Switzerland by the French in 1798 overthrew the aristocratic régime and freed Vaud and Aargau from the domination of Bern. The struggle that went on throughout the Nineteenth Century between the Liberals and Conservatives resulted in the substantial victory of the former party. The power of the Church was limited, the State Constitution was repeatedly revised in a democratic sense, and after 1870 the principle of the referendum was developed with great completeness. Consult: Mülinen, *Bern's Geschichte, 1191-1891* (Bern, 1891); Haendeke and Mueller, *Das Münster in Bern* (Bern, 1894).

BERN, bĕrn, *Ger. pron.* bĕrn (Fr. *Berne*). The second in area and the most populous and important of the cantons of Switzerland, situated in the northwestern part of the country, bordering on France on the north and west (Map: Switzerland, B 1). Its area is 2657 square miles. The canton belongs geographically to two mountain systems. The Jura ranges cover its northeastern part, while the Alps traverse the southern portion. In the centre the surface is only slightly elevated and is crossed by the fertile valleys along the Aar. Bern belongs to the basin of the Rhine, and is watered chiefly by the Aar and its tributary, the Emmen. The chief lakes are Thun, Brienz, and Bienne. Bern is essentially an agricultural canton and is one of the best cultivated portions of Switzerland. In the lower parts grain and fruit are raised, while in the mountain regions more attention is paid to the raising of domestic animals and to dairy industries. The mineral products include iron, granite, gypsum, and turf. Mineral springs are abundant, and there are numerous mountain resorts in the southern part of the canton. Bern has several well-developed industries, among the most important being the manufacture of textiles, watches, and metalware. In spite of the mountainous character of its surface, the canton has good transportation facilities; its railway mileage is one of the largest in Switzerland.

The form of government is purely democratic. The Grand Council, elected by the people at the rate of one member to every 2000 inhabitants, is the sole legislative body, while the Executive Council of nine members, nominated by the Grand Council, is intrusted with the executive part of the administration. Members of both Houses serve four years. Every financial transaction involving more than 500,000 francs must be submitted to a referendum. For administrative purposes the canton is divided into thirty districts, administered each by a prefect elected by the voters of the respective districts. The Supreme Court of the canton consists of fifteen members appointed by the Grand Council for four years. Primary education is compulsory, and the expenses are borne by the communes. The University of Bern (q.v.), a polytechnical school, and a number of gymnasia and progymnasia provide higher and secondary education. Population, in 1888, 539,305; in 1898, 549,387. Nearly 90 per cent. of the inhabitants are Protestants, and the remainder Catholics, with the exception of about 1250 Jews. The German language is spoken by over 85 per cent. of the population, and French and Italian by the remainder. For history, see BERN (city).

BERN, CONFERENCE OF, or DISPUTATION OF. A conference held in 1528, which led to the establishment of the Reformation in Bern. Some years before the Bishop of Lausanne demanded the indictment of certain preachers of Reformed doctrines, but the city council refused to interfere. The conflict increased steadily until, on November 27, 1527, the great council of the city decided to settle the disputes by appeal to the Word of God. Invitations were sent to the bishops of Constance, Basel, Lausanne, and Valais, and all the Swiss cantons were asked to send delegates and learned men. The bishops declined, and Charles V. advised trust and recourse to the anticipated general council. But the Bern Council was held, January 5-26, 1528, and as the result Bern went definitely over to the side of the Reformation. The local reformers were Francis Kolb and Berthold Halle, who drew up the ten theses for the debate; but Zwingli was present and helpful.

BERN, University of. Originally a local school, enlarged about 1528 by the addition of advanced classes, particularly in theology, to meet the increased demand for such instruction made by the Reformation. Early in the Eighteenth Century it was further enlarged by the addition of chairs in science, medicine, and law. The Napoleonic period seriously affected the university, as it did others near to the French frontier; but in 1834 it was reorganized, and is now a State institution, supported by the Canton of Bern, and on the same plan as most similar universities. It has an income of about 600.000 francs, and an endowment for special purposes of 1,000,000 francs. Its 1200 students include over 250 women, and are divided among the faculties of evangelical theology, Catholic theology, philosophy, law, medicine, and veterinary medicine. The library has 35,000 volumes.

BER'NADOTTE, *Fr. pron.* bâr'ná'dŏt'. See Charles XIV. John, King of Sweden.

BERNARD, bẽr'nard *or* bẽr-närd'; *Fr. pron.* bâr'när', Saint (1091-1153). A learned Roman Catholic ecclesiastic. He was born of noble parents at Fontaine, near Dijon, in Burgundy, 1091; was educated at Court, but withdrew with his four brothers and some friends into seclusion for six months, and then became a monk of Citeaux, in 1113; founded a new monastery of that order, which was called the Cistercian, at Clairvaux, in Champagne, lived in the monastery, and himself became its first abbot, in 1115. His ascetic life, solitary studies, and stirring eloquence made him, during his lifetime, the oracle of Christendom. He was honored with the title of the 'Mellifluous Doctor,' and his writings were termed 'a river of paradise.' Although a mystical theologian, he was a man of eminently practical mind. He was consulted largely by the potentates of his day upon policies of state, and exercised great influence with the Popes of his time. In 1128 he gave the rule to the Knights Templars and was their ardent advocate. He took a deep interest in the Christian occupation of the Holy Land, and so, when disaster came upon the Christians there, he preached a second Crusade, which started in 1147. Charged by the Pope to excite the religious zeal of the people of France and Germany, he accomplished his mission with fatally memorable success. Fields, towns, cities, and castles were in many places almost depopulated, and innumerable legions, fired by his prophetic eloquence, hurried to the East, nine-tenths of whom never saw their homes again. He prophesied their success; but when, instead, the news of the failure of the Crusade reached Europe, he fairly sank under the weight of the depression which fell upon him. He died August 20, 1153, and was canonized by Alexander III. in 1174.

Bernard's writings are regarded as among the most exalted in the whole range of mystical theology. He is one of the most notable exponents of the contemplative theology of the Mediæval Church, and he ranks in this regard with Hugh and Richard of Saint Victor and Saint Bonaventure. He was a stalwart opponent of the rationalism of Abélard. Luther says of Saint Bernard: "If there ever lived on earth a God-fearing and holy monk, it was Saint Bernard of Clairvaux." He was one of the most enthusiastic advocates of monasticism. His writings are exceedingly numerous. They consist of epistles, sermons, and theological treatises. Of the first, we possess 439; of the second, 340; and of the third, 12. They are all instinct with genius, though it is difficult for us now to appreciate their extraordinary influence. Several of his hymns, e.g. "Jesus, the Very Thought of Thee," "O, Sacred Head, Now Wounded," are found in our hymn books. The best edition of the works of Saint Bernard is that of Mabillon, printed in Paris in 1890 (2 vols.), reprinted in Venice (6 vols.), in Paris in 1835-40 (4 vols.), and again in 1854 (4 vols.). The monks of the reformed branch of the Cistercians, which he instituted, are often called, after him, Bernardines. He gave name also, in France, to the nuns of the Cistercian Order, which his sister, Saint Humbeline, is said to have founded.

A complete French translation of his works appeared in Paris, 1873, 8 vols. His letters were translated into English by Samuel J. Eales, D.C.L., 2 vols. (London, 1889), as the opening volumes of a complete English translation; Mr. Eales also published a translation of Bernard's *Cantica Canticorum*, 86 sermons on the Song of Solomon (1895); from these 31 sermons were selected and published in English translation, *The Song of Songs* (1901). Other modern English translations are: *The Holy War*, by S. R. Maitland (Gloucester, 1827); *Four Homilies upon the Incarnation* (1843); *Letter on Conversion* (London, 1856); *Sermons for the Seasons of the Church* (1861); *The Jubilee Rhythm on the Name of Jesus* (1867); *The Glories of the Virgin Mother and Channel of Divine Grace* (Boston, 1867); *How to Live Well* (Oxford, 1886). For the biography of Saint Bernard, consult: Neander (Berlin, 1813; new edition, Gotha, 1889; Eng. trans., London, 1843); Morison (London, 1863); S. J. Eales (London, 1890); Ratisbonne (Paris, 1841; Eng. trans., New York, 1878); R. S. Storrs (New York, 1892); E. Vacandard (Paris, 1895); W. J. Sparrow-Simpson (London, 1895); T. Halusa (Regensburg, 1898).

BERNARD OF CLUNY, klụ'nē' (c.1122-56). A Benedictine monk, under Peter the Venerable. He was born of English parentage at Morlaix, in Brittany; hence he is called sometimes Bernard of Morlaix, or, in Latin form, Bernardus Morlanensis. No details of his life are known. Yet he has attained immortality in hymnology, owing to the circumstance that in the opening of his poem, "De Contemptu Mundi," he gives a description of heaven, which in the translation of John Mason Neale became the three beautiful hymns, "Jerusalem the Golden," "The World Is Very Evil," "For Thee, O Dear, Dear Country." The poem itself is by no means heavenly in its general contents, but is a fierce castigation of the sins of the mediæval Latin Church. It is in three thousand lines of dactylic hexameters of such extraordinary difficulty that the author says that he was only enabled by divine help to produce them! There are several early and scarce editions of the original text, and one modern one in the Rolls series in the second volume of Thomas Wright's *Anglo-Latin Satirical Poets of the Twelfth Century* (London, 1872, 2 vols.). For the translations referred to, see J. M. Neale, *The Rhythm of Bernard de Morlaix on the Celestial Country*, Latin and English (London, 1859; 7th ed., 1866).

BERNARD, bâr′när′, Claude (1813-78). A French physiologist. He was born at Saint-Julien, near Villefranche, in the Department of Rhône, July 12, 1813. He studied medicine in Paris; was admitted in 1839 as a surgical interne in one of the hospitals, and in 1841 became one of Magendie's assistants at the Collège de France. He was graduated in 1843 a doctor in medicine, and ten years later a doctor in science; and was appointed in February, 1854, to the chair of general physiology in connection with the Faculty of Sciences in Paris. The same year he was chosen member of the Academy of Sciences, and in 1855 he succeeded Magendie as professor of experimental physiology in the Collège de France. Bernard's first researches were devoted to the physiological study of the various secretions of the alimentary canal. His memoir, published in 1844 in the *Gazette médicale*, treats of the mechanism by which the gastric juice is secreted, and also of the modifications which alimentary substances undergo from that liquid. To the *Comptes rendus* of the biological society he also contributed papers on the saliva, on the intestinal juice, on the influence of the different pairs of nerves on the digestive apparatus, and on the respiratory and circulatory systems. His first really original paper, however, treated of his *Researches on the Function of the Pancreas*, in which he demonstrated that that viscus is the true agent of the digestion and of fatty bodies. This essay obtained, in 1849, the grand prize of the French Academy in experimental physiology, and was printed in the *Comptes rendus* of the Academy of Sciences in 1856. In 1849 appeared his first researches on the glycogenic function of the liver, establishing the doctrine that the blood which enters the liver does not contain sugar, while blood which leaves that organ and goes to the heart by the hepatic veins is charged with it. He also showed the influence of the nervous system on this function, demonstrating that the formation of sugar in the liver could be interrupted by division of the pneumogastric nerve, and also that a puncture of the floor of the fourth ventricle of the brain produced diabetes. For these discoveries, which were keenly criticised, but are now regarded as veritable, he obtained, in 1851, the grand prize of the French Academy in experimental physiology. In 1852 he published his experimental researches on the great sympathetic system, and on the influence exerted by division of the sympathetic nerve on animal heat. This paper procured him for the third time the prize of experimental physiology, in 1853. From 1854, when he succeeded Roux as member of the Institute, he continued his researches on the glycogenic function of the liver, and also published his courses of lectures at the Collège de France on *Experimental Physiology in Its Application to Medicine* (1855-56); on *The Effects of Toxic and Medicated Substances* (1857); on *The Physiology and Pathology of the Nervous System* (1858); on *The Physiological Properties and the Pathological Alteration of the Various Liquids of the Organism* (1859); on *Nutrition and Development* (1860); and his *Introduction to the Study of Experimental Medicine* (1865). In 1862 he became officer of the Legion of Honor; in 1867, commander; and in 1869 he was made a member of the Academy. He was a founder of the Société de Biologie, and its president from 1867 to the time of his death. He died in Paris. His obsequies were conducted at the public expense, which was an honor never before conferred on a scientific man.

BERNARD, bẽr′nẽrd, Sir Francis (?1711-79). An English lawyer; a colonial governor of Massachusetts and New Jersey. He graduated at Oxford in 1736, distinguished himself at the bar, and in 1758 was appointed the Governor of New Jersey, whence, after two years, he was transferred to the Colony of Massachusetts Bay. During the early part of his administration he enjoyed the good will of the people; but on the division of the two parties he favored the Crown, and by his harsh measures contributed greatly toward hastening the Revolutionary War. On the strength of his unfavorable representations regarding the designs of the colonists, troops were ordered to Boston, and the indignation aroused by this act was increased by his proroguing the General Court because that body refused to vote supplies for the soldiers. In 1769 he was recalled, and his departure was made an occasion of general public rejoicing. He took a special interest in Harvard College, and when its library was destroyed by fire in 1764 he raised funds for replacing it. He published *Letters to the Ministry* (1769); *Select Letters on the Trade and Government of America* (1774), etc.; and his *Letter Books* are now in the library of Harvard University, as the bequest of Dr. Jared Sparks, who bought them in 1848.

BERNARD, John Henry (1860—). An English clergyman and author. He was born in India and was educated at Trinity College, Dublin, where he received several prizes. He was made chaplain to the Lord-Lieutenant of Ireland in 1886. He translated several of the philosophical works of Kant, and has published the following: *From Faith to Faith: University Sermons* (1895); *Archbishop Benson in Ireland* (with Professor Atkinson, 1896); *Via Domini: Cathedral Sermons* (1898); *The Irish Liber Hymnorum* (1898).

BERNARD, Montague (1820-82). An English lawyer, born at Tibberton Court, Gloucestershire, and educated at Trinity College. He was appointed to the newly established chair of international law and diplomacy at Oxford in 1859. He was one of the commissioners who came to the United States and signed the Treaty of Washington (1871), and in 1872 represented the British Government at Geneva. In 1874 he resigned his professorship at Oxford, because of the pressure of his public employments, but he afterwards was active in bringing about the compromise by which the interests of the college and the university were identified. His literary works include numerous lectures on international law and related subjects.

BERNARD, Saint, of Mentone (923-1007). The founder of the hospices upon the Great and Little Mount Saint Bernard. He was born at Mentone, near Annecy, Savoy, 923; was well educated, as his parents were titled people; early embraced a priestly life at Aosta, and became archdeacon of the city. Later on he took up the monastic life and founded the hospices (962). He died at Novara, probably May 28, 1007. Other dates are commonly given, as it is difficult to get at the real facts. For his biography, consult L. Burgener (Lucerne, 2d ed., 1870). See Saint Bernard the Great.

BERNARD, bâr′när′, Simon (1779-1839). A French engineer and general. He served in the Army of the Rhine under Napoleon, who made him his aide-de-camp in 1813. In the retreat after the battle of Leipzig (1813) he was severely wounded, and in the same year was conspicuous for defending Torgau during a vigorous siege of three months. He adhered to the Restoration, and in 1816 obtained permission to go to the United States on the invitation of President Madison. In this country, where he arrived with Lafayette in 1824, he was employed by the Government as chief engineer of the army, and in this capacity planned Fortress Monroe and some of the defenses around New York. He also had a considerable share in some of the great civil engineering works of the time, notably the Chesapeake and Ohio Canal and the Delaware Breakwater. When the Revolution of 1830 in France broke out, he returned to that country, and prepared plans for the fortification of Paris. He was Minister of War in 1834, and again from 1836 to 1839.

BERNARDIN DE SAINT-PIERRE, bâr′när′dăɴ′ de săɴ pyâr. See Saint-Pierre.

BERNARDINO OF SIENA, bĕr′när-dē′nō sē-ā′nȧ, Saint (1380-1444). An Italian Franciscan friar, born at Massa di Carrara. He entered the Franciscan Order in 1404, and was appointed vicar-general of the Order in 1438. The strictness of the earlier monastic rule was restored by him. He was famous as a preacher, and wrote several mystical works. He was canonized in 1450. His writings were published in Venice in 1594, and again in 1745 (4 vols.). For his biography, consult Toussaint, *Das Leben des heiligen Bernhard* (Regensburg, 1873).

BERNARDO DA VENEZIA, bĕr-när′dō dȧ vȧ-nā′tsē-ȧ (?-1436). An architect of the closing period of Italian Gothic. He was Court architect to Gian Galeazzo Sforza, Duke of Milan, and author of the plans for the *Certosa* (q.v.) at Pavia in 1396. He was consulting architect of the Cathedral of Milan and constructed the Church of Santa Maria del Carmine, the finest Gothic church in Milan after the cathedral. Its superb façade is in five divisions, with rich details. He also erected the castle of Pavia. His Venetian origin explains the resemblance in the interior of the *Certosa* to Venetian churches.

BERNARDO DEL CARPIO, dĕl kär′pē-ō. A Spanish warrior. He was the son of Don Sancho de Saldaña and Ximena, the sister of Alfonso II. of Leon, who had been secretly married. On learning of the marriage the King imprisoned Don Sancho and had his eyes put out, and sent his wife to a convent. The boy was brought up at court, gained early renown in the wars against the Moors, and became one of the most famous soldiers of the Ninth Century. Incensed because he could not obtain his father's liberty, Bernardo went over to the Moors and established himself in the strong castle of Carpio, whereupon the King promised to release the father if Bernardo would surrender the fortress. It is uncertain what became of Don Sancho, but according to some chronicles Bernardo went to France, where he became a wonderful knight-errant. His name occurs frequently in romances, ballads, and plays, and is the title of an epic poem of 1624. Lope de Vega makes him a national hero and conqueror of Roland at Roncesvalles. Mrs. Hemans has also made poetic use of him.

BERNARDO DELLA GIRANDOLE, dĕl′lȧ jē′rän-dō′lā. See Buontalenti, Bernardo.

BERNAUER, bĕr′nou-ẽr, Agnes (?—1435). A beautiful girl of Augsburg, whom Duke Albert of Bavaria loved and married (1432). His father, Duke Ernest, intent upon gaining for his son the hand of Anna of Brunswick, caused Agnes to be accused of witchcraft and drowned (1435). Albert in his grief and resentment made war upon his father, but was finally reconciled, erected a monument to the memory of Agnes, and married Anna of Brunswick. The story of Agnes Bernauer has been made the theme of a number of poems, novels, and plays. Consult Count Törring, *Agnes Bernauerin* (Stuttgart, 1891).

BERNAY, bâr′nā′. The capital of an arrondissement in the Department of Eure, France, on the Charentonne, 17 miles southeast of Lisieux. It has two fine churches, those of Sainte Croix and Notre Dame, dating from the Fourteenth Century, and remains of an abbey of the Eleventh Century, now fitted up for public offices, and the abbey church as a market. A noted horse fair, one of the most important in France, is held annually during the fifth week in Lent. Population, in 1896, 7966.

BERNAYS, bĕr′nīs, Augustus Charles (1854—). An American surgeon. He was born in Saint Louis, Mo., and was educated at McKendree College, Lebanon, Ill., and at the University of Heidelberg. After studying a year at the Royal College of Surgeons, England, he began to practice surgery in Saint Louis, Mo., where in 1883 he was appointed professor of anatomy and clinical surgery in the College of Physicians and Surgeons. Afterwards he was appointed to the same position at Marion Sims College and at Woman's Medical College. He ranks among the leading surgeons of the United States, and has been among the first to carry out successfully several important operations. These are treated in the works entitled: *Kolpohysterectomy; a New Operation for the Treatment of Retroflexion of the Uterus*, and *The First Successful Case of Cæsarean Section for Placenta Prævia*.

BERNAYS, bĕr′nīs, Jakob (1824-81). A German philologist; of Jewish parentage. He was born in Hamburg, and was educated at the University of Bonn, where he was professor extraordinary and librarian from 1866 until his death. His complete works, which deal chiefly with Greek philosophy, were edited by Usener (Berlin, 1885). In classical philology his most important production is an edition of Lucretius (1856). Consult C. Schaarschmidt, *Biographisches Jahrbuch* (Berlin, 1881).

BERNAYS, Leopold John (1820-82). An English divine, translator, and author. He was born in London, and was a son of Adolphus Bernays (1794-1864), professor of the German language and literature at King's College, London, from 1831 to 1863. He was educated at Saint John's College, Oxford, was headmaster of Elstree School from 1847 to 1860, and rector of

Great Stanmore, Middlesex, from 1860 until his death. With the exception of an ephemeral translation of *Faust*, comprising in all 50 copies, and published in London in 1838, Bernays's English translation of Part II. of the famous German drama was the first to appear, being published in London in 1839, under the title *Faust: a Tragedy, Part II.; Translated from the German, Partly in the Metres of the Original and Partly in Prose, with Other Poems, Original and Translated* (1842). Among the further publications of Bernays may be mentioned *The Church in the Schoolroom* (1851).

BERNAYS, Lewis Adolphus (1831—). An Australian scientist, brother of Leopold John Bernays. He was born in London, and was educated at King's College. He subsequently emigrated to New Zealand, whence, after a sojourn of two years, he proceeded to New South Wales, where he was an officer of Parliament from 1853 to 1859. For the past 43 years he has been clerk of the Legislative Assembly of Queensland, a position analogous to that of clerk of the House of Commons. He was the founder, and for sixteen years vice-president of the Queensland Acclimatization Society. In recognition of his distinguished services to the Crown in the Legislative Assembly, as well as in the Department of Economic Botany, he received the title of C.M.G. in 1892. His publications include *Cultural Industries for Queensland; The Olive and Its Products*, and contributions to the Linnæan and Royal Geographical societies.

BERNAYS, Michael (1834-97). A German literary historian, brother of Jakob Bernays, born in Hamburg. He studied at Bonn and Heidelberg, and in 1873 was appointed professor of the history of literature at Munich. His works have to do chiefly with Goethe and Shakespeare, and include *Briefe Goethes an F. A. Wolf* (1868); *Zur Entstehungsgeschichte des Schlegelschen Shakespeare* (1872); and *Goethe und Gottsched* (1880). He also prepared a revised edition of the translation of Shakespeare by Schlegel and Tieck.

BERNBURG, bĕrn′bo͞orK. A town in the German Duchy of Anhalt, till 1863 capital of Anhalt-Bernburg, situated on the Saale, 23 miles south of Magdeburg (Map: Germany, D 3). The town is divided into three sections—the Altstadt and the Neustadt, with the suburb of Waldau on the left bank of the river, and the Bergstadt on the right, connected by a stone bridge. Bernburg is well built, has several educational and charitable institutions, and manufactures of porcelain, paper, cement, and starch. It also has breweries, distilleries, mills, and iron foundries. Old Bernburg was a fortified town as early as the Tenth Century. Population, in 1890, 28,326; in 1900, 34,418.

BERNE-BELLECOUR, bârn′ bĕl′ko͞or′, Etienne Prosper (1838—). A French painter, born in Boulogne. He was a pupil of Picot and Barrias, and at first painted landscapes and portraits. His reputation was, however, achieved with accurate and spirited pictures of episodes of the Franco-Prussian War. His works, many of which are in private collections in the United States, include the following list: "Cannon Shot" (1872), "In the Trenches" (1877), "Attack on the Château of Montbéliard" (1881), and "To Arms!" (1891).

BERNECK, bĕr′nĕk, Karl Gustav von (*Bernd von Guseck*, pseudonym) (1803-71). A German novelist and military writer, born at Kirchhain. In 1820 he was appointed an officer of cavalry, in 1839 an instructor in the division school at Frankfort-on-the-Oder, and in 1848-62 in the military and engineering school in Berlin. His military works include: *Geschichte der Kriegskunst* (1867), *Elemente der Taktik* (1870), and other similar volumes. He also translated the *Divine Comedy* of Dante, wrote the librettos for two of Kreutzer's operas, and published a number of stories, such as *Die Hand des Fremden* (1857), and *Der Graf von der Liegnitz* (1869).

BERNER, bĕr′nĕr, Albert Friedrich (1818—). A German criminologist. He was born at Strassburg, Brandenburg, and studied at the University of Berlin, where in 1848 he was appointed professor of law. His best-known work is a *Lehrbuch des deutschen Strafrechts* (1857, 16th ed., 1891), frequently translated. He has also written a number of other volumes, including *Judentum und Christentum und ihre Zukunft* (1891).

BERN′ERS, or **BARNES,** Lady Juliana (b. 1388?). Though little is known about Dame Juliana, she is said to have been the daughter of Sir James Berners, beheaded on Tower Hill in 1388, and to have become, in the Fifteenth Century, prioress of Sopwell nunnery, in Hertfordshire. To her is attributed, on the authority of the Colophon, one of the first books printed in England, *The Boke of Saint Albans* (1486), comprising treatises on hawking, hunting, and heraldry. The book was printed at Saint Albans, but the name of the printer is unknown. In 1496 Wynkyn de Worde published a second edition, to which was added a treatise on fishing. In this continuation there is a quaint woodcut of a fisherman, which has become celebrated. During the Sixteenth Century the book was extremely popular, as is evidenced by the numerous editions. Consult: Facsimile of first edition, with introduction by Blades (London, 1881); facsimile of the treatise on fishing, Watkins (London, 1880); and a version of the latter treatise from manuscript, made for the London Dialect Society, Vol. XIX., Satchell (London, 1883).

BERNHARD, bĕrn′härt, Count of Anhalt and Duke of Saxony (1140-1212). The founder of the present ducal dynasty of Anhalt. He was the youngest son of Albert the Bear, the first Margrave of Brandenburg, who died in 1170. In addition to inheriting part of his father's dominions, out of which arose the little State of Anhalt, he came into possession of a portion of the Duchy of Saxony. When the country was partitioned by Henry the Lion, he also received a portion of the Dukedom of Saxony. His last political action was the forcible reinstatement of Archbishop Waldemar, at Bremen, in the face of the determined opposition of the Pope and of the Danish King.

BERNHARD, Duke of Saxe-Meiningen (1649-1706). The founder of the present ducal dynasty of Saxe-Meiningen. He was a son of Duke Ernest the Pious of Saxe-Gotha, and received his education at the University of Tübingen. After the death of his father (1675) he ruled in conjunction with his six brothers, until a settlement was effected whereby the Duchy of

Meiningen was assigned to him as a separate possession, June 20, 1681.

BERNHARD, Duke of Saxe-Weimar (1604-39). A celebrated German general. He was born in Weimar, the youngest of the eleven sons of John III., Duke of Saxe-Weimar. On the outbreak of the Thirty Years' War he took the side of Protestantism against the Emperor, and first distinguished himself in 1622 at Wimpfen. Subsequently he became colonel in the army of Christian IV. of Denmark and took part in the bold expedition of Mansfeld through Silesia to Hungary. When, in 1630, Gustavus Adolphus made his appearance in Germany, Bernhard was one of the first who flew to his standard, and now entered upon the brilliant career which entitles him to rank as one of the most famous leaders in the Thirty Years' War. He was conspicuous in the attack upon Wallenstein's position at Nuremberg, in 1632, and won the indecisive victory at Lützen, having assumed the command after the death of Gustavus Adolphus. One of his most splendid achievements was the taking of Ratisbon in 1633. In 1634 Bernhard and the Swedish general, Horn, suffered a terrible defeat at Nördlingen. When Richelieu took up the cause of the Protestants, Bernhard was enabled to maintain a large force by means of a French subsidy. In 1638 he opened the most brilliant campaign of his military career, the crowning success of which was the conquest of Breisach. He died suddenly at Neuenburg on the Rhine.

BERNHARD VON NORDALBINGEN, bĕrn′härt fōn nôrd′äl′bĭng-*e*n. See BASEDOW, JOHANN BERNHARD.

BERNHARDT, *Fr. pron.* bârn′ärt′, *Ger. pron.* bĕrn′härt, ROSINE, called SARAH (1844—). A noted French actress. She is a Jewess, of French and Dutch parentage, born in Paris, October 22, 1844, but having been baptized into the Christian faith by her father's desire, was brought up in a convent. Entering the Paris Conservatoire in 1858, she gained second prizes for both tragedy and comedy, and in 1862 made her début in Racine's *Iphigénie* at the Théâtre Français, but attracted little notice, and soon left the theatre, only to meet with less success in burlesque at the Gymnase and Porte Saint-Martin. In 1867 she began to play minor parts at the Odéon, where her performance of the Queen of Spain in *Ruy Blas*, and of Zanetta in Coppée's *Passant*, revealed the force of her genius. She was recalled to the Théâtre Français in 1872, after the Franco-Prussian War. In 1874 she achieved a new triumph as Berthe de Savigny in *Le Sphinx*, and shortly afterwards became a regular member of the company. In her rapidly extended répertoire one of the notable successes was her Doña Sol, in Victor Hugo's *Hernani*. In 1879 she appeared in London, where she excited great enthusiasm. The next year, after the production of Augier's *L'Aventurière*, she abruptly severed her connection with the Théâtre Français, but was condemned to pay $20,000 costs and damages for this breach of contract. Shortly afterwards she made a lucrative and very successful tour in the United States, appearing in *Adrienne Lecouvreur*, *La Dame aux Camélias*, and other plays. She has since toured extensively in both North and South America, as well as in Russia, and other parts of Europe. In 1882 she was married to Jacques Damala, a Greek actor, from whom she was separated in 1883. For several years she played at the Vaudeville and Porte-Saint-Martin theatres, among her productions being Sardou's *Fédora* and *La Tosca*. In 1893 she took the Théâtre de la Renaissance, where were produced *Gismonde* and *La Samaritaine*. Before the Exposition of 1900, however, she transferred herself to a larger theatre in the Place du Châtelet, which had been for a time the home of the Opéra Comique. Here she appeared as Hamlet, and as L'Aiglon in Rostand's drama. The latter she brought to America, with Constant Coquelin, in 1900. Bernhardt is noted for her versatility, and besides activity upon the stage has exhibited excellent work as a painter and sculptor. She has also appeared as an author, with *Dans les nuages* (1878), and a comedy called *L'Aveu*, produced at the Odéon in 1888. Scarcely less noted than her fascinating power as an actress are the personal caprices and eccentricities which help to keep her in the public eye. Among the tales that are told is that of the coffin which she ordered made and upholstered with her souvenirs, to keep in her chamber and serve as her occasional resting-place. She is undoubtedly the foremost French actress of her time, and for years has challenged comparison with her great predecessor, Rachel. Consult Jules Huret, *Sarah Bernhardt*, with a preface by Edmond Rostand (Eng. trans., Philadelphia, 1899).

BERNHARDY, bĕrn′här-dê, GOTTFRIED (1800-75). A German philologist, born at Landsberg, Brandenburg. He held a professorship at the University of Berlin from 1825 until 1829. He was professor in the University of Halle and director of the Philological Seminary from 1829 until his death. Among his chief publications are *Wissenschaftliche Syntax der griechischen Sprache* (1829); *Grundriss der römischen Litteratur* (1830); *Grundriss der griechischen Litteratur* (1836-45); and an edition of Suidas, 4 vols. (1834-53). Consult Volkmann, *Gottfried Bernhardy* (Halle, 1887).

BERNI, bĕr′nẻ, FRANCESCO (c.1497-1535). An Italian satiric poet. He was born at Lamporecchio about 1497-98, and was successively in the service of his relative, Cardinal Bibbiena, of Ghiberti, Bishop of Verona, and of the Cardinal Ippolito de' Medici, who, in 1533, appointed him a canon at Florence. He died in 1535, poisoned, according to one story, by the Cardinal Innocenzo Cibo, because he would not lend himself to a plot to kill a certain Cardinal Salviati. Berni's most serious work was a recast or *rifacimento* of Boiardo's *Orlando Innamorato*. The discrepancy between the simple sincerity of Boiardo's style and the florid elegance of Ariosto's continuation was felt to mar the unity of the whole, and Berni, though he could not hope to rival Ariosto's brilliancy, produced a version of Boiardo which won the warm approval of his contemporaries, though it finds scant sympathy from modern critics. Berni's *Rime* are more justly celebrated. They are models of easy, familiar, satiric verse, marred only by their frequent indecency; and, while he has had many imitators in this vein, he has remained unsurpassed. Mocking or burlesque poetry has since his day been called *Poesia Bernesca*. The best edition of the *Rifacimento* is that of Florence (1827-28), and contains a biography by Corniani. The *Rime*, *poesie latine e lettere,* were last edited by Virgili (Florence, 1885).

BERNICE, bẽr-nī′sē. See Berenice.

BERNIER, bâr′nyâ′, François (?—1688). A French physician and traveler, born at Angers. He took his degree of doctor at Montpellier, departed for the East about 1654, and visited Syria, Egypt, Arabia, and India, in the last of which countries he resided for twelve years in the capacity of physician to the Great Mogul. On his return to France he published an account of his travels in India, *Les voyages de Bernier* (1699). This work is delightful in style and accurate in the delineation of manners and customs, as well as in the description of places.

BERNINA, bẽr-nē′nȧ. A mountain of the Rhætian Alps in the southeastern part of the Swiss Canton of Grisons (Map: Switzerland, D 2). It attains an altitude of 13,300 feet in its highest peak, and is covered with numerous glaciers, among which the Morteratsch, Forno, and Roseg are the largest. The Bernina Pass, situated at an elevation of about 7700 feet, over which a carriage road has been constructed from Samaden to Tirano, unites the valley of the upper Engadine on the north with the Valtellina on the south, and is much frequented during seasons of good grape harvest.

BERNINI, bẽr-nē′nē, Giovanni Lorenzo (1598-1680). The most celebrated Italian sculptor of the Baroque period, also renowned as an architect. The son of a Tuscan sculptor employed at Naples, he was born in that city December 7, 1598. Under his father's careful training, he carved creditably at the age of eight. After their removal to Rome, the boy's remarkable endowments procured him, in his tenth year, an audience with Paul V., who prophesied that he would be the Michelangelo of his century. The boy studied for three years with tireless energy among the antiques of the Vatican, and in his teens executed groups which placed him in the foremost rank of his day. In the best-known of these, the "David," his own portrait, "Apollo and Daphne" (both in the Villa Borghese), and the "Rape of Proserpine" (Villa Lodovisi), all the characteristics of his fully developed style appear. He was made a knight of the Order of Christ by Gregory XV., and, with the accession of his friend and preceptor Urban VIII., he became the practical dictator of all artistic undertakings. After two years' study in painting and architecture, required by the Pope for the great project, he designed and erected the colossal baldacchino under the cupola of Saint Peter's with its crooked columns. On the death of Maderna in 1629, he became architect of Saint Peter's, and completed the Barberini Palace, himself designing the grandiose façade and elliptical staircase. His most attractive statue of this period is "Santa Bibbiana" in Saint Peter's. Two years before Urban VIII.'s death, he began his celebrated tomb in Saint Peter's, with the highly characteristic bronze statue of the Pope. His chief works under Innocent X. were the "Saint Theresa" group in Santa Maria della Vittoria, and the celebrated fountain of the Piazza Navona. Under Alexander VII. (1655-67), he designed the colonnade of Saint Peter's and the Scala Regia connecting the church with the Vatican—works of the highest arhitectural order. Of far less importance is the celebrated "Catedra di San Pietro" in the apse of the church, designed to support the traditional chair of the first Roman bishop. After having for fifty years dictated the artistic taste and achievements of the Papacy, during which time he designed or executed 37 busts, 58 statues, and 50 architectural works, he died in Rome November 28, 1680. Never during his lifetime has an artist received greater honor and appreciation. On his journey to Paris, where he furnished a design of construction for the Louvre to Louis XIV., he was everywhere received like a royal personage. His conceptions dominated the sculpture of Europe for over a hundred years. To modern taste they are far less pleasing; for, while his work displays great technical ability and fine decorative quality, it is exaggerated in form and theatrical in action. His biography was written by a relative, Domenico Bernini (Rome, 1713); consult also Dohme, *Kunst und Künstler* (Leipzig, 1879); Lalanne, *Journal du voyage de cavalier Bernini en France* (Paris, 1885); Fraschetti, *Il Bernini* (Milan, 1899).

BERNIS, bâr′nēs′, François Joachim de Pierres de (1715-94). A French prelate and diplomatist, born at Saint-Marcel, Ardèche. He was educated for the priesthood, but turned first to diplomacy and became Ambassador to Venice in 1752. He represented France in the negotiations preceding the Seven Years' War, and became foreign secretary in 1757. Next year he was made a cardinal, but offended the King and was banished from court. In 1764 he recovered the royal favor and was made Archbishop of Albi. On the election of Clement XIV., he became Ambassador to Rome, and carried out the wishes of Choiseul, his successor as foreign secretary, in urging the suppression of the Jesuits. He lost his dignities at the Revolution, refusing to take the oath of allegiance to a constitution "of which an essential feature was the destruction of the ancient discipline of the Church," and died a pensioner of Spain. Consult his memoirs and letters (Paris, 1878, ed. Masson; Eng. trans., New York, 1902); also his correspondence with Voltaire (Paris, 1799).

BERNOULLI, bâr′nōō′yē′, or **BERNOUILLI.** The name of a family famous for the successful cultivation and extension of mathematical and physical science. Its original habitat was Antwerp, but the attachment of the founder of the family (Jakob) to the Reformed religion forced him to seek an asylum in Frankfort-on-the-Main. Later on the family established itself at Basel, where several of the family acquired great distinction. The relationship between the most important members of the family was as follows: Nicolas Bernoulli (1623-1708) had eleven children, including Jakob (1654-1705), Nicolas, and Johann (1667-1748). Famous among their descendants are a son of Nicolas, likewise named Nicolas (1687-1759), and three sons of Johann, named Nicolas (1695-1726), Daniel (1700-1782), and Johann (1710-1790). Two sons of the last named are celebrated: Johann (1744-1807) and Jakob (1758-1789). See the following articles.

BERNOULLI, Daniel (1700-82). He was born at Groningen, and was the second son of Johann (Jean) Bernoulli. After having studied mathematics with his father, he studied medicine. He occupied successively a chair of mathematics at Saint Petersburg (1725-32), a chair of anatomy and physics at Groningen, and chairs of anatomy, botany, and physics at Basel. He was a member of several academies, and took numerous prizes in Paris. Daniel Bernoulli was extremely versatile. His principal work is the *Hydrodynamica*, in which he first developed the kinetic theory of gases.

BERNOULLI, Jakob, Jacques, or James (1654-1705). A celebrated mathematician. He was born at Basel. Destined by his father for a chair of theology, he early showed his preference for science, and, after visiting France, Holland, and England, he was made professor of mathematics in the University of Basel (1687). He and his younger brother, Johann (q.v.), were among the first to understand and use the new method of Leibnitz. He solved the latter's problem (1687) of the isochronous curve, proposed and solved the problem of the catenary, solved that of the brachistochrone proposed by Johann, contributed to the theory of isoperimetry, and, in general, was one of a famous group of problem solvers, including his brother, Leibnitz, l'Hôpital, and Huygens. The result of the disputes over these problems was a serious estrangement between his brother and himself. He was a voluminous writer, his principal works including: *Conamen Novi Systematis Cometarum* (Amsterdam, 1682), suggested by the appearance of the comet of 1680; *Dissertatio de Gravitate Ætheris* (Amsterdam, 1683): and his contributions to the *Acta Eruditorum*, in one of which (May, 1690) the word 'integral,' as applied to a differential equation, is used for the first time, although Leibnitz had already used the symbol $\int$. The best known of his works, *Ars Conjectandi* (1713), published posthumously (by Nicolas Bernoulli), extended the doctrine of probabilities to moral, political, and economical subjects.

In connection with the effort to prove that the number of times an event can happen in n trials lies between definite limits, Bernoulli proved the celebrated proposition, according to which "it is always possible to increase the number of trials till it becomes a certainty that the proportion of occurrences of the event will differ from p, its probability on a single trial, by a quantity less than any assignable."

His works were published under the title *Jacobi Bernoulli Basileensis Opera*, in two volumes (Geneva, 1744). At his request, recalling the example of Archimedes (q.v.), a logarithmic spiral was engraved on his tomb, with the motto, *Eadem Mutata Resurgo*: and this is still to be seen in the cloisters of the cathedral at Basel. Consult: Saalschütz, *Vorlesungen über die Bernoullischen Zahlen* (Berlin, 1893); and Cantor, *Geschichte der Mathematik* (2d ed., Leipzig, 1898).

BERNOULLI, Jakob, or Jacques (1758-89). He was born at Basel. At the age of 21 he undertook the duties of the chair of experimental physics at Basel, his uncle Daniel having resigned the post on account of old age. A little later he became professor of mathematics at Saint Petersburg, and married a granddaughter of the great mathematician Euler. He was shortly after drowned in the Neva. Several of his memoirs were published in the *Nova Acta Academiæ Petropolensis.*

BERNOULLI, Johann, or Jean (1667-1748). He was born at Basel. He and his brother Jakob were the first two foreigners honored by an election to the academies of Paris and Berlin. At the age of 28 he was appointed professor of mathematics at Groningen, and on the death of his brother, ten years later, succeeded him in a similar chair at Basel. As a teacher of mathematics he had no superior in his day. Among his pupils was Euler, whom he encouraged in his first efforts, and among his friends was Leibnitz, whose cause he always championed. Unfortunately, he had a very jealous disposition, which showed itself not only in his relations with his brother, but even with his own son (Daniel). His *Opera Omnia*, in 4 vols., quarto, were published at Geneva in 1742; and his correspondence with Leibnitz, in 2 vols., at Lausanne in 1745. He proposed the problem of the brachistochrone and that of the minimum line between two points on a given surface; founded, jointly with his brother Jakob, the theory of isoperimeters, and was one of the pioneers in the work of constructing an exponential and an integral calculus, and to recognize completely the legitimacy of the real results from calculations involving the imaginary.

BERNOULLI, Johann, or Jean (1710-90). He was born at Basel, and was a brother of Daniel, and the third son of Nicolas Bernoulli. He occupied successively the chairs of eloquence and mathematics at Basel. The Academy of Science of Paris honored him three times for his contributions to the theory of heat and light. He was also a member of the Berlin Academy. His two sons, Johann and Jakob, were likewise famous men of science.

BERNOULLI, Johann, or Jean (1744-1807). He was born at Basel. He received the degree of doctor of philosophy at the age of 13, and was made astronomer to the Academy of Berlin at the age of 19. His later works did not fulfill his youthful promise. His principal contributions were: *Recueil pour les astronomes* (3 vols., Berlin, 1772-76, with a supplement in 1779), and *Lettres astronomiques* (1781).

BERNOULLI, Niclaus, or Nicolas (1695-1726). He was born at Basel, and, like several other members of his family, was a youthful prodigy. At the age of 8 he could speak German, Dutch, French, and Latin; at 16 he took the degree of doctor of philosophy at Basel, and at 20 he received the degree of doctor of laws. He was professor of jurisprudence at Bern, and professor of mathematics at Saint Petersburg, where he died. He wrote a history of the problem of trajectories. His important papers were published in an edition of his father's works in 1742.

BERNOULLI, Nicolas (1687-1759). He was born at Basel. He was a friend of Newton and Halley, whom he visited in England; was a corresponding member of the principal academies of Europe, and professor of mathematics at Padua, and of law and logic at Basel. He edited the *Ars Conjectandi* of his uncle Jakob. His own contributions relate chiefly to differential equations.

BERNSTEIN, bĕrn′stin, Aaron (1812-84). A German publicist and author. He was born at Danzig, of Jewish parentage. His admirable translation of the *Song of Songs* (published under the pseudonym of A. Rebenstein, 1834) and his publication of the work entitled *Das junge Deutschland* established his fame as a writer among the literary critics of Berlin. In 1849 he founded the *Urwählerzeitung*, in which (in 1851) he published some ultra-democratic articles which brought about his imprisonment. The paper was finally suppressed in 1853, when Bernstein established the *Volkszeitung*, a journal devoted, like its predecessor, largely to the dissemination of democratic views. His numerous and varied publications include *Revolutions- und Reaktionsgeschichte Preussens und Deutschlands von den Märztagen bis zur neuesten Zeit* (3 vols., 1883); and *Aus dem Reiche der Naturwissenschaft* (1856), later republished under the title *Naturwissenschaftliche Volksbücher* (1880, and frequently reprinted), a valuable work, which has been translated into nearly all the languages of Europe.

BERNSTEIN, Eduard (1850—). A German social-democratic leader, born in Berlin. In 1878 he became private secretary to Höchberg, the publisher of the *Zukunft*, and from 1881 to 1890 was editor of the *Sozialdemokrat*. His socialistic views made it desirable for him to withdraw to London in 1888, but he returned to Germany, and in 1901 became editor of the *Vorwärts*. Bernstein combats Marx's *laissez-faire* teaching—that the concentration of capital, the extinction of the entrepreneur, and the rapid growth of the proletariat class presage the desirable and inevitable industrial revolution, and that, therefore, partial reforms in the interests of the latter class are undesirable by contradicting at the outset the assertion about the disappearance of the middleman. As a matter of fact, he declares, the entrepreneur class is being steadily recruited from the proletariat class, and therefore all compromise measures, such as the State regulation of the hours of labor, provisions for old-age pensions, and so on, are to be encouraged and taken advantage of. For this reason he urges the laboring classes to take an active interest in politics. His published works, besides an edition (1891-93) of the speeches and writings of Lasalle, include *Die Voraussetzungen des Sozialismus und die Aufgaben der Sozialdemokratie* (1899); *Zur Geschichte und Theorie des Sozialismus* (1900), and other works.

BERNSTEIN, Georg Heinrich (1787-1860). A German Orientalist. He was born January 12, 1787, at Cospeda, near Jena. He studied at the universities of Jena, Leipzig, and Göttingen, and in 1812 became assistant professor of Oriental literature at the University of Berlin, and in 1821 full professor at Breslau. He made many journeys to the great libraries of Europe, visiting Oxford, London, Cambridge, Florence, Rome, Naples, and Venice, and gathering scientific material drawn chiefly from manuscript sources. His greatest philological activity was displayed in the publication of Syriac texts, the most noteworthy being the *Chronicle of Bar-Hebræus* (1822) and portions of the same author's *Horreum Mysterionun* (1858). In the domain of Arabic literature, he is known for his edition of the *Poem of Safi ed-din* (1816). He also published a new and entirely revised edition of Kirsch's *Chrestomathia Syriaca* (1832-36), which is still used as a text-book at universities. It was his intention to publish an elaborate Syriac dictionary, of which, however, only the first part appeared (1857). He died at Lauban, on April 5, 1860.

BERNSTEIN, Julius (1839—). A German physiologist, born in Berlin. He became professor of physiology at Heidelberg in 1869, at Berlin in 1871, and at Halle in 1872. The character of his researches is expressed in the titles of such works by him as *Untersuchungen über den Erregungsvorgang im Nerven- und Muskelsystem* (1871) and *Die fünf Sinne des Menschen* (2d ed., 1889).

BERNSTORFF, bĕrn′stôrf, Albrecht, Count (1809-1873). A Prussian diplomatist and statesman, born at Dreilützow (Mecklenburg-Schwerin). He was secretary of legation at Saint Petersburg and Paris, and in 1840 was sent as envoy to Naples. He was appointed Ambassador at Vienna in 1848, at Naples in 1852, and at London in 1854. As Minister of Foreign Affairs in 1861-62, he concluded commercial treaties with China and Japan. From 1867 to 1871 he was Ambassador at London, successively of Prussia, the North German Confederation, and the German Empire.

BERNSTORFF, Andreas Peter, Count (1735-97). A Danish statesman, Minister of Foreign Affairs in Denmark from 1772 to 1780, and from 1784 to 1797. He was born in Hanover and was the nephew of Johann Bernstorff. He was instrumental in securing the emancipation of the Danish peasantry begun by his uncle; took an active part in concluding the negotiations for the 'armed neutrality' (q.v.), and arranged for the abolition of serfdom in Schleswig-Holstein. He was a steadfast champion of liberal principles and energetically opposed every restriction of the press.

BERNSTORFF, Johann Hartwig Ernst, Count (1712-72). A Danish statesman, born in Hanover. He was the representative of the Government at the Diet of Ratisbon in 1737, and became Minister of Foreign Affairs in 1751. To his policy was due the neutrality of Denmark during the Seven Years' War, and he contributed in every way to the prosperity of the country, promoting commerce, industries, art, and science. He emancipated the peasants on his estates. Frederick the Great styled him the 'Oracle of Denmark.'

BERNWARD, bĕrn′värt. A German ecclesiastic, Bishop of Hildesheim from 993 to 1022. He was at first Court chaplain of Emperor Otho III. He greatly promoted the welfare of his bishopric. He founded the cloister of Saint Michael, and began the erection of Saint Michael's Church. He surrounded Hildesheim with walls, and developed art and industry. He was canonized in 1193. Consult the biography by Thankmar, in *Monumenta Germaniæ Historica*, Vol. IV. (Berlin, 1893); and Sommerwerck, *Der heilige Bernward* (Hildesheim, 1885).

BEROALDO, bā′rō-äl′dō, Filippo (1453-1505). An Italian scholar, born at Bologna. He gave lectures at Parma, Milan, and Paris, and was afterwards professor of ancient literature at the University of Bologna. He published valuable annotated editions of Lucan, Suetonius, Aulus Gellius, Propertius, and other Latin authors, thus contributing much to the literary renaissance. Consult Burckhardt, *Die Kultur der Renaissance in Italien* (Leipzig, 1899).

BERŒA. See Berea.

BERO′SUS (Gk. Βηρωσός, *Bērōsos*, probably the Assyr. *Bérūsu*). An historian and priest of Belus at Babylon. He was a native of Bithynia and so acquainted with Greek. He wrote, about B.C. 280, three books on Babylonian history (Βαβυλωνικά), dedicated to King Antiochus I. Soter, in which he made use of the temple chronicles at Babylon. This work interested especially the Jews and later the Christians for its agreement with the early Jewish records. It has come down to us only in fragments preserved by Josephus, Eusebius, Syncellus, and others, who, however, drew not directly from Berosus, but from Alexander Polyhistor and Apollodorus. Besides this history, he wrote a special work on Chaldean astrology (Χαλδαϊκά). Fragments were edited by Richter (1825); Müller, *Fragmenta Historicorum Græcorum* (Paris, 1848). The work, *Antiquitatum Libri Quinque Cum Commentariis Ioannis Annii*, first published (Rome, 1498) in Latin as a work of Berosus, was actually written by the Dominican Giovanni Nanni, of Viterbo.

BERQUIN, bâr′kăɴ′, Arnaud (c.1749-91). A French author; born at Langoiran. He won his first success with his *L'ami des enfants*, 6 vols. (1782-83), which was crowned by the French Academy (1784), and supplied him with a popular surname. He was an editor of the *Moniteur*, and a contributor to the *Feuille villageoise*. His complete works appeared in Paris in 20 vols. (1803).

BERQUIN, Louis de (1489-1529). A French Huguenot, born at Passy. He studied law, and was appointed a counselor of Francis I. He was a friend of Erasmus, and having been conspicuous in his defense of the new doctrine, was imprisoned and called upon to retract. Rescued by the intervention of the King, he retired to Amiens, but was again imprisoned, and was burned alive in Paris. He was the first French Protestant martyr. He published *Enchiridion vrai du chevalier chrétien* (1529), and other works.

BERREDO E CASTRO, bâr-rā′dō, Bernardo Pereira di (c.1680-1748). A Portuguese historian, born at Serpa. He entered the army and fought at the battle of Saragossa (1710), where his bravery gave him the appointment of Governor-General of the Province of Maranhão, Brazil. In 1718 he became Captain-General of Mazagao. This history to which Berredo devoted the rest of his life has acquired great value by reason of the destruction of many of the documents in the Portuguese archives, upon which it was based. It is entitled, *Anales historicos, do estado do Maranhão, em que se dà noticia de seu descobrimento e tudo o mais que n'elle se tem succedido disde o anno em que foi descoberto até ó de 1718* (1749).

BERRIEN, bĕr′rĭ-ĕn, John Macpherson (1781-1856). An American lawyer and politician. He was born in New Jersey, and graduated at Princeton in 1796. He was judge of the eastern district of Georgia from 1810 to 1821, was a United States Senator from 1825 to 1829, and again from 1840 to 1852, and was Attorney-General in Jackson's first Cabinet from 1829 until 1831, when he resigned.

BERRUGUETE, bĕr′rōō-gā′tȧ, Alfonso (1480-1561). A Spanish architect, sculptor, and painter, born at Paredes de Nava. He studied in Florence and in Rome, where he worked with Michelangelo. Upon his return to Spain he was appointed director of all the building enterprises of the Crown, as well as first Court painter and sculptor. His principal architectural works are the town hall of Seville and the royal palace at Granada. As a sculptor he is best known for his "Transfiguration" in the Toledo Cathedral, and as a painter he is well represented by his canvases at Salamanca and Valladolid.

BER′RY, or **BERRI** (anciently, Lat. *Biturica*, inhabited by the *Bituriges*, a Gallic tribe). One of the old French provinces, now forming the departments of Indre and Cher. In ancient times it formed part of Aquitania, and passed under the domination of the Franks in the Sixth Century. Later it enjoyed its independence under a line of hereditary counts. In 1360 it was made a duchy, and in 1601 annexed by the French Crown. It gave title at various times to French princes, the younger son of Charles X. being the last to hold it.

BERRY (AS. *berie, berige*, Ger. *Beere*, Goth. **basi* in *Weinabasi*, grape, literally 'wine-berry;' probably originally 'edible fruit,' cf. Skr. *bhas*, to chew). A fleshy fruit which is pulpy throughout and has a thin skin; such as the grape, currant, tomato, etc. See Fruit.

BER′RY, *Fr. pron.* bȧ′rē′, Charles Ferdinand, Duc de (1778-1820). The second son of the Comte d'Artois who later became Charles X. of France. He was born in Versailles, January 24, 1778. An *émigré* of the Revolution, he served under Condé until the armistice of Leoben, when he entered the Russian service. After his discharge he visited England and married a Miss Brown, whom he soon abandoned on the ground that Louis XVIII. disapproved of the marriage. In 1815 he was appointed to an important post by the King, and in 1816 he married Marie Caroline Ferdinande Louise, Duchess of Naples. One daughter, Louise Marie Thérèse d'Artois, was born of this marriage in 1819, and a posthumous son, Henri, on September 29, 1820. The father was assassinated in February, 1820, by one Louvel. Henri, at first styled Duc de Bordeaux and later Comte de Chambord, was heir to the French throne after the death of Charles X., but though called Henri V. by his partisans, he was excluded from the throne by the July Revolution of 1830. His mother, a woman of great ambition and courage, entered into a project for reinstating the Bourbons, but she was arrested after landing in France in 1832, and was imprisoned in the citadel of Blaye. Her confession that she had formed a second marriage with the Neapolitan Marquis Lucchesi-Palli destroyed her political importance, and she was set at liberty. She died in 1870. Henri died without heirs in 1883. Consult: Chateaubriand, *Mémoires sur le duc de Berry* (Paris, 1820), which is royalist and eulogistic in tone; and Chateaubriand, *Complete Works*, Vol. III. (Paris, 1834).

BER′RY, Hiram George (1824-63). An American soldier. He was born in Thomaston (now Rockland), Maine, and in early life served several terms in the State Legislature. At the beginning of the Civil War he joined the Union army as colonel of the Fourth Maine Volunteers. He participated in both the first and second battles of Bull Run; was made brigadier-general in 1862; and in November of the same year became major-general, but was killed while leading a bayonet charge on the second day of the battle of Chancellorsville.

BERRY, Mary (1763-1852). An English author, born at Kirkbridge, Yorkshire. She and her sister Agnes (who was fourteen months her junior) had a remarkable association with Horace Walpole, beginning in 1788. In his letters Walpole spoke of both in terms of the strongest affection and endearment, in one instance addressing them as his 'twin wives.' It was solely for their amusement that he wrote his *Reminiscences of the Courts of Georges I. and II.* (1789). He established the sisters at Teddington, in 1789, and two years later he induced them to make their home at Little Strawberry Hill, the sometime residence of his friend Kitty Clive. It was said that Walpole was willing to marry either sister. His will provided for them by a bequest to each of £4000, and to both, the house and property at Little Strawberry Hill. Mary Berry's literary productions include the comedy, *Fashionable Friends; England and France, a Comparative View of the Social Conditions in Both Countries* (1844), and an edition of the *Works of Horace Walpole* (1798), collected and edited by her.

BER'RYBONE FISH. A fish of the Scottish Devonian rocks representing a group (order Arthrodira, family Coccosteidæ), allied to the lung fishes, but having the fore part of the body "protected by large bony plates, of which one pair is articulated by a hinge to the hinder part of the skull." These bones bear a pustular or berry-like sculpture. "The fore limbs were either rudimental or wanting, but a pair of pelvic fins were developed." See Dipnoi; and Plate of Dipnoi and Chimæra.

BERRYER, bâr'yâ', Pierre Antoine (1790-1868). A French advocate, political leader, and orator. He was born in Paris, and first distinguished himself by his defense of victims of the Restoration. In 1829 he was chosen deputy, and ever afterwards steadily represented the rights and policy of the elder Bourbons; at the same time he adhered to liberal principles and repeatedly undertook the defense of persons prosecuted by the Government. It was he who defended Louis Napoleon after the Boulogne *attentat.* With the elder Bourbons he was in constant communication, and was one of the heads of the Legitimist party who made a pilgrimage to the Comte de Chambord in London, in 1843. After the Revolution of 1848 he was elected to the National Assembly. He became a member of Louis Napoleon's privy council, but he nevertheless went to Wiesbaden in 1850, to do homage to the Comte de Chambord. When Changarnier was removed from his command, Berryer united with Thiers and others to oppose the pretensions of the President, and boldly protested against the coup d'état. In 1854 he was elected a member of the French Academy. Berryer added greatly to his reputation as an orator by his defense of Montalembert (q.v.) against the Government prosecution in November, 1858. In 1863 he was induced to enter the Corps Législatif. Berryer was wonderfully effective both as a political orator and as an advocate.

BER'RYVILLE. A town and county-seat of Clarke County, Va., 10 miles east of Winchester, on the Shenandoah Valley Railroad (Map: Virginia, G 2). It contains the Berryville Female Institute and the Shenandoah University School. The town is in a fertile agricultural region, of which it is the commercial centre, and has some manufactures. Originally known as Battletown, Berryville occupied a place of considerable interest in the early history of the State. Population, in 1900, 938.

BERSAGLIERI, bĕr'sȧ-lyä'rē (It., plur. of *bersagliere,* sharpshooter, from *bersaglio,* a mark). A corps of infantry in the Italian Army. They were originally formed and organized as a corps of riflemen or sharpshooters by Victor Emmanuel in 1850. Their first active service was with the Allies against the Russians in the Crimean War. In the battle of the Tchernaya, August 16, 1855, the Russian attack was successfully and brilliantly repelled, largely by the gallantry of the Bersaglieri. At the naval battle of Lissa, July 20, 1866, where the Austrians under Tegetthoff defeated the Italians under Persano, a detachment of these riflemen were serving on one of the latter's ships, the *Re d'Italia,* which eventually was sunk. It is recorded that the Bersaglieri kept up an effective fire on the enemy until actually engulfed with their ship beneath the water. Their uniform is of dark green, with a felt hat, on one side of which is displayed their distinguishing badge of a full plume of cock-feathers. Their strength in 1901 was given as 12 regiments, each regiment consisting of 3 battalions of 4 companies each, making a total of 14,072 under arms; 36,285 on unlimited leave; 18,764 mobile militia, and 32,391 territorial militia.

BER'SERK, or **BER'SERKER** (Icel. *berserkr;* cf. Engl. *bear* + *sark,* shirt; referring to the skins of animals which the ancient heroes wore). The name of a redoubtable hero in Scandinavian mythology, the grandson of the eight-handed Starkader and the beautiful Alfhilde. He despised mail and helmet, and, contrary to the custom of those times, went always into battle unharnessed, his fury serving him instead of defensive armor. By the daughter of King Swafurlam, whom he had slain in battle, he had twelve sons, who inherited the name of Berserker, along with his warlike fury. The name Berserker, among the early Norse people, was applied to a combatant whose love of fighting induced a frenzied state called the 'berserk'scourse,' in which he was dangerous to both friend and foe. In later times the title was given to companies of hard fighters who were retained as bodyguards or special champions of renowned leaders.

BERSEZIO, bĕr-sä'tsē-ō, Vittorio (1830—). An Italian author, born at Peveragno (Piedmont). He was long active as an editor and as a writer of fiction, drama, and works of history. He founded and edited the *Gazzetta piemontese* (1865) and the *Gazzetta letteraria;* published a long series of tales, including *Il novelliere contemporaneo* and *Galatea;* wrote a number of comedies in Piedmontese dialect, the most important of which is *Le miserie de monssù Travet;* also a historical work, *Il regno di Vittorio Emanuele II.* (1878-1895).

BERSIER, bâr′syâ′, Eugène Arthur François (1831-89). A pulpit orator of the Reformed Church of France. He was born at Morges, near Geneva; studied at Geneva, Göttingen, and Halle; and became a preacher in Paris in 1855. He died there November 19, 1889. He was much admired as a preacher, and many of his sermons were published and translated into different languages. Besides these his publications embrace *Histoire du Synode de 1872* (1872 2 vols.); *Coligny avant les guerres de religion* (1884, Eng. trans. 1885); *La révocation; Projet de révision de la liturgie des églises réformées de France* (1888); *Histoire d'une petite fille heureuse* (1890); in English, *Sermons* (London, 1881-1901, with personal sketch of the author 1885-91). Consult J. F. B. Tinling, *Bersier's Pulpit: An Analysis of the Published Sermons of Pastor Eugène Bersier* (1901).

BERSOT, bâr′sō′, Pierre Ernest (1816-80). A French philosopher and publicist. He was born at Swegeres (Charente-Inférieure), studied at the Normal School, Paris, and later taught philosophy at Rennes, Paris, Bordeaux, Dijon, and Versailles. He refused to take the oath after the coup d'état of 1851, and was dismissed from his post. In 1866 he entered the Academy of Moral and Political Sciences, and in 1871 was appointed director of the Normal School. His works are profound, and are written in an elevated style. They include *Essai sur la providence* (1853), considered his most important work; *Littérature et morale* (1861), and *Libre philosophie* (1858). His educational reports are also of interest. Consult E. Scherer, *Un moraliste; études et pensées d'Ernest Bersot* (1859).

BERT, bâr, Paul (1833-86). A French scientist and politician, born at Auxerre. He was professor of physiology in Bordeaux and afterwards in Paris, and was a member of the Academy of Sciences; was elected to the National Assembly in 1874, and was reëlected in 1877, and became noted for extremely radical opinions. He advocated compulsory education, and endeavored to exclude all religious teachings from the schools. In the short-lived Gambetta Cabinet (1881-82), he was Minister of Public Instruction. Bert carried out many broad and interesting investigations in physiology, including researches on skin-grafting; on the effects of increase and of diminution of atmospheric pressure upon the living organism; on respiration and asphyxia; on the action of anæsthetics, and on the toxic properties of oxygen. He published numerous scientific works, among which may be noticed *De la greffe animale* (1863) and *La pression barométrique* (1878). His *Discours parlementaires* were published in 1881. Consult Berillon, *L'œuvre scientifique de Paul Bert* (Paris, 1887).

BERTEAUX, bâr′tō′, Héléna Hébert, Madame Léon (1828—). A French sculptor, born in Paris. She was the pupil of her father, the painter and engraver Pierre Hébert, and of Dumont, and exhibited first at the Salon of 1849, with a portrait statuette in plaster. She is the founder and president of the "Société de l'Union des Femmes Peintres et Sculpteurs," which since 1881 has held an annual exhibition in Paris. She received medals in 1864 and 1867, a second class in 1873, and a gold medal at the Exposition of 1889. Her most important works are: "Jeune fille au bain" (1873—reëxhibited 1876), statues for the façades of the New Tuileries, a public fountain at Amiens (1864); "Le Baptisme du Christ," at Notre Dame de Vincennes; "Saint Mathieu et saint Laurent," at the Church of Saint Laurent in Paris; and a number of portrait busts, including one of François Boucher, for the National Academy of Music.

BER′THA. The name of several women, real and legendary, of the Middle Ages. Saint Bertha, whose day is observed on July 4, was the beautiful and pious daughter of Charibert, King of the Franks. She married (A.D. 560) Æthelbert, King of Kent, and became the means of his conversion and of the spread of Christianity among the Anglo-Saxons. In the romances of the Charlemagne cycle, a Bertha with the Big Foot figures as the daughter of Count Charibert of Laon, wife of Pepin the Short, and mother of Charlemagne. In the romances of the Round Table, another Bertha is a sister of Charlemagne and mother of the renowned Roland. Bertha, daughter of Burkhard, Duke of the Alemanni, and wife of Rudolph II., King of Trans-Jurane Burgundy, after her husband's death, in 937, acted as regent for her infant son, Conrad. Subsequently she married Hugo, King of Italy, and died toward the close of the Tenth Century. She enjoyed the reputation of being an excellent housekeeper, and is represented on monuments of the times seated upon her throne with her spinning-wheel by her side.

BERTHA. A character in the comedy *The Beggar's Bush*, by Fletcher, Massinger, and Rowley. She is stolen by the usurper Wolfert, but finally rescued by Vandunke, her supposed father, and restored to her possessions and lover. She disguises her identity under the name of Gertrude.

BERTHELOT, bâr′tlō′, Pierre Eugène Marcellin (1827—). A French chemist. He was born in Paris. He received his education at the Collège Henri IV. and devoted himself to research in organic chemistry. In 1854 he received his doctor's degree in science, on presenting a remarkable thesis giving an account of his artificial reproduction of natural fats. The fact that fats are mixtures of glycerides, i.e. compounds of glycerin with the so-called fatty acids, had been known since 1823, when Chevreul effected the decomposition of fats into their chemical constituents. Berthelot, however, was the first to produce those important organic products synthetically. In the same thesis he showed that glycerin, which is capable of combining with three equivalents of a monobasic acid, is an alcohol; and thus the idea of polyatomic alcohols was first introduced into chemistry. A large number of diatomic, triatomic—in general, polyatomic alcohols, have since been prepared, and form an important class of organic compounds. (See Alcohols.) In 1851 Berthelot became assistant to Balard at the Collège de France; in 1860 he was made professor of organic chemistry at the Ecole de Pharmacie, and in 1865 a new chair of chemistry was founded for him at the Collège de France, where he has since lectured on theoretical chemistry. In 1873 he was elected member of the Institute, and in 1889 perpetual secretary of the Academy of Sciences. In 1876 he was made inspector-general of higher education; in 1881 a lifelong member of the Senate; in 1886-87 he was Minister of Public

Instruction and in 1895-96 Minister of Foreign Affairs.

M. Berthelot is one of the most brilliant experimental chemists of our time. One of the pioneers of organic synthesis, he has contributed to our knowledge of almost every class of carbon compounds, and the importance of his experimental researches on explosives and dyestuffs cannot be overestimated. He also furnished an immense number of experimental data concerning the phenomena of heat, which accompany chemical transformations, and the science of thermochemistry is largely based on his observations, although his theoretical interpretation of those phenomena has been proved to be erroneous. According to Berthelot, the heat evolved during a chemical reaction measures the power that causes the reaction. It has, however, been proved, both theoretically and experimentally, that while this principle holds good in many cases, it is by no means a general law, "a third principle of thermodynamics," as Berthelot still claims it to be. Berthelot's published works include: *Chimie organique fondée sur la synthèse* (2 vols., 1860); *Leçons sur les principes sucrés* (1862); *Leçons sur les méthodes générales de synthèse* (1864); *Leçons sur l'isomérie* (1865); *Traité élémentaire de chimie organique* (1st ed. 1872; 2d ed., with Jungfleisch, 2 vols., 1881); *Sur la force de la poudre et les matières explosives* (1871, 1872, and 2 vols. 1883); *Vérification de l'aréomètre de Baumé* (1873); *La synthèse chimique* (1875); *Essai de mécanique chimique fondée sur la thermochimie* (2 vols., 1879); *Les origines de l'alchimie* (1885); *Collection des anciens chimistes grecs* (2 vols., 1887); *La chimie au moyen âge* (3 vols., 1893); *Traité pratique de calorimétrie chimique* (1893). He also published a large number of papers on various scientific topics, in the *Comptes rendus de l'Académie des Sciences* and in the *Annales de chimie et de physique*. For his life, consult the *Popular Science Monthly*, May, 1885.

BERTHIER, bâr'tyā', ALEXANDRE (1753-1815). Prince of Neuchâtel and Wagram and Marshal of the French Empire; born at Versailles. He fought under Lafayette in the American War of Independence. At the outbreak of the French Revolution he was appointed major-general of the National Guard of Versailles, and rose to be a general of division and chief of staff in the Army of Italy, 1795; and three years later, in the absence of Bonaparte, proclaimed the Republic of Rome. He was Napoleon's chief of staff in the Egyptian campaign, and was Minister of War from 1799 to 1808. He was made Prince of Wagram for his part in the battle of that name. Berthier was Napoleon's proxy in the marriage of Maria Louisa, in Vienna, 1810. Until 1814 he was constantly at Napoleon's side, and was very valuable in superintending the movements of armies because of his activity, system, and insight. Napoleon recognized his good qualities, but claimed that Berthier was incapable of leading the smallest army corps alone. When the tide turned against Napoleon, Berthier's course was vacillating. After his surrender at Neuchâtel he made his peace with Louis XVIII., who gave him high positions. He retired to Bavaria on Napoleon's return from Elba, became insane, and committed suicide, July 1, 1815. He wrote *Relation des campagnes du général Bonaparte en Egypte et en Syrie* (1800), and *Relation de la bataille de Marengo* (1806). His *Mémoires* were published in Paris in 1827.

BERTHOLD VON REGENSBURG, bĕr'tōlt fōn rā'gens-bōōrk (c.1220-72). A German Franciscan preacher. He seems to have been born at Regensburg, where he received his education under David of Augsburg, a well-known teacher in the Franciscan monastery there. After 1250 he preached as an itinerant in South Germany, Switzerland, Austria, Bohemia, and Moravia, and after several years returned to Ratisbon. He is buried in the cathedral there. In his preaching he departed from the Latin homily and formed his style largely on the best French models of the day. His sermons were usually preached in the open, and were attended by great throngs of people. The best edition of Berthold's sermons is that by Pfeiffer and Strobl (Vienna, 1862-80). There is also an edition in modern German by Göbel (Regensburg, 1873; latest revise, 1884). For his life, consult Unkel (Cologne, 1882).

BERTHOLLETIA, bẽr'thŏl-lē'shĭ-ȧ. See BRAZIL NUT.

BERTHOLLET, bâr'tō'lā', Count CLAUDE LOUIS (1748-1822). A distinguished French theoretical chemist. He was born at Talloire, a village of Savoy, near Annecy. He studied at the University of Turin, and obtained a medical degree there in 1768. He afterwards went to Paris, where he was appointed physician to the Duke of Orleans. He now applied himself with great assiduity to chemistry; in 1780 he was elected a member of the Academy of Sciences, and, some time after, the Government made him superintendent of dyeing processes. In this situation he published a very valuable work on dyeing. In 1785 he announced his adherence to the antiphlogistic doctrines of Lavoisier, though he did not admit oxygen to be the acidifying principle, and herein he has proved to be right. In the same year he published a paper on "dephlogisticated marine acid"—now called chlorine—pointing out its use for bleaching purposes; and following up the experiments of Priestley, he showed ammonia to be a compound of three volumes of hydrogen gas and one volume of nitrogen. During the early part of the French Revolution Berthollet traveled through the country, giving instruction as to the best means of extracting and purifying saltpeter to be used in the manufacture of gunpowder, and also as to the process of smelting and converting iron into steel. In 1794 he became professor at the Ecole Normale. His joining the expedition of Napoleon to Egypt led to the formation of the Institute of Cairo. On his return from Egypt he was made a senator by Bonaparte, who also conferred on him several marks of honor, and made him a count. Notwithstanding, he voted for the deposition of Napoleon in 1814. On the restoration of the Bourbons, he was made a peer; but in spite of all these honors he remained simple, modest, and unassuming. In collaboration with Lavoisier and others, he devised the system of chemical nomenclature which is still, in its main features, employed. Berthollet was the first to introduce the idea of equilibrium into chemical philosophy. Since the time of Bergman, it had been believed that the only factor determining the course of a reaction is the mutual chemical affinity of the reacting substances. Thus, when common salt (sodium chloride) is acted on by sulphuric acid, the latter takes up the sodium of the former and hydrochloric acid is set free. According to Bergman's teaching, the cause of this phenomenon lies in the fact that sodium has a stronger affinity for sulphuric than for hydrochloric acid. Berthollet, however, advanced the view that besides chemical affinity, there is another important factor upon which the course of a chemical reaction depends: viz. the relative masses of the reacting substances and of the products of the reaction. If hydrochloric acid, which is a gas, was not allowed to escape during the reaction and a certain mass of it would remain in the reacting mixture, then only part of it would be driven out of combination with sodium, so that when the reaction would reach the state of equilibrium, the mixture would contain, on the one hand, both sulphuric and hydrochloric acids in the free state, and, on the other hand, both the sulphate and the chloride of sodium. The development and application of Berthollet's idea form one of the most important chapters of theoretical chemistry and have thrown much light on chemical combination. Berthollet's principal work, *Essai de statique chimique*, in two volumes, appeared in Paris in 1803. Consult: Cuvier, *Eloge de Claude Louis Berthollet* (Paris, 1826); and Müller, *Berthollet's Leben* (Erlangen, 1828).

BERTHOUD, bâr'tōō', Samuel Henri (1804-1891). A French author. He was born at Cambrai, where he edited the journal published by his father, entitled *La Gazette de Cambrai*. Afterwards he removed to Paris, where he collaborated on *Le Monde* and on the *Revue des Deux Mondes*. He contributed to *La Patrie* a number of essays on natural science, under the pseudonym of *Sam*, which were subsequently collected in book form under the titles *Fantaisies scientifiques* (4 series, 1861) and *Petites chroniques de la science* (1867-71). He published several historical works, such as *Chroniques et traditions surnaturelles de la Flandre* (1831-34), a number of novels and many entertaining books for children, such as *La France historique, industrielle et pittoresque* (1835-47) and *Histoires pour les petits et pour les grands enfants* (1863).

BERTI, bĕr'tē, Domenico (1820-97). An Italian author and legislator, born at Cumiana, Province of Turin. He became professor of ethics in the University of Turin in 1849. From 1870 to 1877 he was professor of philosophy in the University of Rome. He was Minister of Education in the La Marmora (1866) and Ricasoli (1867) Cabinets, and Minister of Commerce from 1881 until 1884. He was a Deputy almost continuously after 1849. He wrote numerous pedagogical and political essays, and, in addition, published *Il conte di Cavour avante il 1848* (1887); *Diario inedito con note autobiografiche di Cavour;* and numerous writings on *Pico della Mirandola*, *Giordano Bruno* (1898); *Copernico* (1876); *Galilei* (1878); *Cesare Alfieri* (1877); *G. Valdès* (1878); and others. He also founded the papers *Rivista Italiana*, *Le Alpi*, and *L'Istitutore*.

BERTILLON (bâr'tē'yôɴ') **SYSTEM.** The name applied to a method of identifying criminals. Until very recently only general descriptions and photographs were employed, the result being that by slight disguises the appearance was so changed that criminals frequently escaped detection.

In March, 1879, Dr. Alphonse Bertillon, of Paris, invented and in 1885 published a plan for securing absolute identification. Three sorts of 'signalements' (descriptions) are employed: A. *Anthropometrical*, based upon: (1) The almost absolute immutability of the human frame after the twentieth year of age; (2) the extreme diversity of dimensions which the human skeleton presents when compared in different subjects; (3) the facility and precision with which certain dimensions of the skeleton may be measured. B. *Descriptive;* a general description. C. Peculiar marks, scars, deformities, etc. Of these marks an exact measurement is taken and their location accurately noted. The color of the eyes is important, as this cannot be changed. Two photographs, one of the full face, the other of the profile, are taken by a camera screwed to the floor, and from a chair likewise fastened so that the relative proportion of height and size are exactly preserved in all pictures. The main reliance, however, is placed on the anthropometrical signalments, as these are never identical for two persons. The measurements taken are (the metric system is always used):

Body	Height (person standing). Reach (outstretched arms—finger-tips to finger-tips). Trunk (height sitting).
Head	Length and width. Length and width of right ear.
Limbs	Length of left foot, left middle finger, left little finger, left forearm.

The measurements, with the other descriptions and the photographs, are put on cards of uniform size. These cards are classified, first according to sex. The cards are then distributed in three tiers of drawers, each tier made up of three drawers, according to the length of the head. The upper tier contains head lengths of 187 millimeters and less; the middle, those between 187 millimeters and 194 millimeters; the third, all above 194 millimeters. Ninety thousand cards would thus be roughly divided into tiers of 30,000 each. Each of these groups is subdivided according as the width of the head is narrow, medium, or broad, each division having about 10,000 cards. A further division, according as the length of the left middle finger is small, medium, or large, will reduce them to groups of 3300 cards. Further analysis soon lowers the number of cards to something like 12 in each group. Thus to locate any card requires but a moment's effort.

The Bertillon system was introduced into the United States in 1887 by Major R. W. McClaughry. It met with a favorable reception and is rapidly being adopted in the larger penal institutions.

Such a system of absolute identification is a "necessary adjunct to the scientific administration of criminal law." It has a deterrent effect upon criminals, who know that if they are caught no disguise can conceal their identity. It enables the officers to distinguish the new from the old offender. It makes impossible the mistaking of an innocent person for some criminal to whom he bears a superficial resemblance. With the increased sentences for repeated offenses, this possibility of identification becomes of vast importance. That local institutions, police courts, etc., should keep such records is, however, not enough. Efforts are now being made to have the National Government establish a central bureau for the collection of all the signalments of the criminals of the country. If the various nations adopted such a plan, the criminal would not escape detection by changing his abode. The discovery of the identity of the assassin of King Humbert through the Bertillon system is a striking proof of its utility. Penologists claim that the influx of foreign criminals in the United States in recent years is partly due to the adoption of the Bertillon system in European countries. It is stated that the larger proportion of the graver crimes are committed by persons not resident in the locality. Consult: A. Bertillon, *Identification anthropométrique* (Paris, 1893); *The Bertillon System of Identification*, R. W. McClaughry, Editor (Chicago, 1896); Boies, *The Science of Penology* (New York, 1901).

BERTIN, bâr′tăN′, Antoine (1752-90). A French poet, born on the Isle of Bourbon. He became a protégé of Marie Antoinette and of the Count of Artois, and was styled by his contemporaries 'the French Propertius.' Toward the close of 1789 he undertook a journey to San Domingo, where he died on the day of his marriage to a young Creole girl, to whom he had long been attached. The latest complete edition of his works, containing his elegies, love poems, the famous *Voyage de Bourgogne*, etc., was published in Paris in 1879, under the title of *Poésies et œuvres diverses.*

BERTIN, Louise Angélique (1805-77). A French poet and composer, a daughter of Louis F. Bertin. She was born at Les Roches, near Bièvres, and cultivated successively painting, poetry, and music. She wrote the operas *Guy Mannering, Le Loupgarou* (Opéra Comique, 1827), which was well received; *Faust* (Italiens, 1881); and *Esmeralda* (text by Victor Hugo, Grand Opéra, 1836). According to Halévy, she had "an abundance of ideas and often revealed a rare power of expression." Two volumes of poems from her pen, respectively entitled *Les Glanes* (1842) and *Nouvelles Glanes* (1876), were published. The former collection received the prize of the Academy.

BERTIN, Louis François (1766-1841). A French journalist known as Bertin Aîné. He was born in Paris, began writing for the press in 1793, and in 1800, with his brother (also called Louis François) assumed the management of the *Journal des Débats*, founded in 1789 by Gaultier de Biauzat. Bertin's Royalist principles offended Napoleon, and caused his banishment to Elba. With great difficulty he obtained permission to live in Italy until 1804, when he returned to Paris and resumed the editorship of the *Débats*, but was much hampered by Napoleon, who imposed on the paper the title of *Journal de l'Empire*, and by subjecting it to police revision, gave it almost an official character. When Bertin, in 1814, became free to follow his own bent, the journal reverted to its Royalist principles. During the Hundred Days it fell into other hands, till the return of the Bourbons restored it once more to Bertin, who, in the meantime, had taken part in the *Moniteur de Gand*. Though he did not join in the protest of the Liberal journals against the *ordonnances*, he gave his adhesion to the July Monarchy, and continued faithfully to support it.

BERTIN, Nicolas (c.1668-1736). A French painter. He was born in Paris and received his artistic training under his brother, the Court sculptor of Louis XIV., and afterwards under Vernansalle, Jouvenet, and Boullongne. In 1685 he obtained the grand prize for the picture entitled "The Building of the Ark." His picture "Prometheus Liberated by Hercules" (Louvre) won him a membership at the Academy (1705), at which institution he became professor in 1715 and adjunct rector in 1733. His numerous paintings, which may be found in the galleries of Toulouse, Orléans, Antwerp, Amsterdam, Dresden, Stockholm, and Saint Petersburg, include: "Saint Philip Baptizing the Eunuch;" "Chastity of Joseph;" "Susanna at the Bath;" "Man with the Gourd;" "Gardener and the Bear."

BERTINI, bĕr-tē′nê, Giuseppe (1825-98). An Italian painter, born in Milan, where he attended the Academy of Art. In 1845 he received the grand prize awarded by the Academy for the best historical picture. Of his paintings on glass, that representing Dante and the Divine Comedy, exhibited in London in 1853, and bought by subscription for the Ambrosian Library, is considered especially fine. He was appointed professor of painting at the Milan Academy in 1860. His other pictures include: "The Vision of Saint Francis of Assisi" (Santa Babila, Milan), "The Death of Saint Joseph" (Parochial Church of Palermo), "Torquato Tasso Introduced to the Duke of Ferrara."

BERTINI, Henri Jérôme (1798-1876). A pianist and composer, born in London. He played in public at the age of twelve, and studied composition in Paris, where, from 1821 on, he devoted himself to teaching with signal success. In 1856 he retired to Meylan, France, where he lived in seclusion until his death. He is remembered for his valuable studies for the pianoforte in 29 sets, which have been edited by Hans von Bülow.

BERTOL′DO. The hero of a popular Sixteenth-Century comic romance, by Julio Cesare Croce, entitled *Vita di Bertoldo*. He is a peasant whom nothing astonishes.

BERTOLONI, bĕr′tô-lō′nê, Antonio (1775-1869). An Italian botanist. He was born at Sarzana, Liguria, and studied medicine and botany at the University of Pavia. He became professor of physics at the Imperial Lyceum of Genoa in 1811, and remained there until 1816, when he was appointed to the same position at the University of Bologna. In addition to his principal work, *Flora Italica* (10 vols., Bologna, 1833-54), and its continuation, *Flora Italica Crytogama* (1858-62), he wrote the following: *Prælectiones rei herbariæ* (1827); *Miscellanea botanica* (1842-63); and *Piante nuove asiatiche* (1864-65).

BERTON, bâr′tôN′, Pierre Montan (1727-1780). A French musician. He was born in Paris, and at the age of 12 composed several motets, which were performed at the Cathedral of Senlis. He afterwards became church organist and musical director at the Theatre of Bordeaux. Upon the death of Boyer, in 1755, he was called to Paris as director of the Royal Opera, where he contributed largely to the successful performance of the works of Gluck (q.v.) and Piccini. He is said to have given the impetus to the improvement of the modern orchestra. He wrote several operas, and rearranged others by Gluck, Lulli, and Rameau.

BER'TRAM. See Ratramnus.

BERTRAM. (1) A character in Shakespeare's *All's Well That Ends Well.* He is the haughty husband of Helena, who wins back his love first by disguising herself as his mistress, Diana, and then by exculpating him from the charge of her own murder. (2) The minstrel in Scott's *Castle Dangerous,* who makes a doughty guide for his charge.

BERTRAND, bâr'träN', Alexandre (1820-1902). A French archæologist, born in Paris. He studied at the Normal School, and subsequently at the French College at Athens, and in 1862 was appointed director of the Museum of Saint Germain. He is best known for his prehistoric studies. For a time he was an editor of the *Revue archéologique,* and he published *Essai sur les dieux protecteurs des héros de l'Iliade* (1857); *Les voies romaines en Gaule* (1863); *La Gaule avant les Gaulois* (1891); and, with S. Reinach, *Les Celtes dans les vallées du Pô et du Danube* (1894).

BERTRAND, Henry Gratien, Count (1773-1844). A French general. He was born in Châteauroux, and entered the corps of engineers. He accompanied the expedition to Egypt, and directed the fortification of Alexandria. Returning with the rank of general of brigade, he distinguished himself at Austerlitz, and became the Emperor's adjutant; and after the battle of Aspern, in 1809, for establishing bridges over the Danube, he was created Count and Governor of Illyria. After sharing with credit in the subsequent campaigns, he followed the Emperor to Elba, returned with him to France, and finally shared his banishment to Saint Helena. After Napoleon's death Bertrand returned to France, where, though sentence of death had been pronounced upon him — a sentence which Louis XVIII. had revoked—he was restored to all of his dignities, and in 1830 was appointed commandant of the Polytechnic School. His sons published, in 1847, the memoirs dictated to him at Saint Helena by Napoleon.

BERTRAND, James (1825-87). A French historical painter, born in Lyons. He was a pupil of Périn and Orsel, later studied in Rome, and won unanimous approval with his "Saint Benedict Taking Communion," exhibited at the Salon in 1859. His works are in the classical style, are of a carefully finished execution, and for the most part are strongly religious in tone. Many of them have been engraved. The list includes: "Conversion of Saint Thaïs" (1861, Lyons Museum), "Brothers of Death Taking Away a Murdered Man in the Campagna" (1863, Lyons Museum), "Death of Virginia" (1869, Luxembourg Museum), "Charlotte Corday's Last Day" (1883), and "Calvary" (1884).

BERTRAND, Joseph Louis François (1822-1900). A French mathematician. He was born in Paris. After graduating at the Polytechnic School, he was attached (1842) to the Service of Mines and later became professor of mathematics and mathematical physics at the Polytechnic School, the Normal School, and the Collège de France, and a member of the Academy of Sciences (1856). In 1874 he was elected perpetual secretary of the Academy of Sciences, and in 1884 a member of the French Academy. In 1867 he was appointed officer, in 1881 commander, of the Legion of Honor. He wrote treatises on arithmetic (1849), algebra (1850), calculus (1864), thermodynamics (1887), probabilities (1889), and a number of memoirs in the scientific journals.

BERTUCCIO, bĕr-tōō'chō. The court jester in *The Fool's Revenge,* which is Tom Taylor's English version of Hugo's *Le roi s'amuse.* The character is identical with that of Triboulet in the French play.

BERTUCH, bĕr'tōōG, Friedrich Justin (1747-1822). A German author and publisher, born at Weimar. He studied at Jena, in 1775 was appointed cabinet-secretary at Weimar, and in 1785 councilor of legation. With Wieland and Schütz he mapped out the plan of the *Jenaische allgemeine Litteraturzeitung,* to which he contributed from 1785 to 1805, and with Kraus he edited the *Journal des Luxus und der Moden.* His original writings, such as the tragedy *Elfriede* (1775), were of slight value; but he published a good translation of *Don Quixote* (1775-76), and a popularly successful compilation, *Bilderbuch für Kinder* (1790-1822). He established at Weimar a kind of literary bureau for the promotion of art and letters.

BÉRULLE, bā'rul', Peter de (1575-1629). A French cardinal and statesman. He was born at the Château de Serilly, near Troyes, and first became conspicuous during the conference at Fontainebleau regarding the Protestants (1600). In 1613 he introduced into France the Carmelite Order, and founded the Congregation of the Oratory. He obtained a dispensation from the Pope sanctioning the marriage of Henrietta, the sister of Louis XIII. of France, and the Prince of Wales (afterwards Charles I.), and subsequently accompanied the Princess to England (1625). As Ambassador to Spain he negotiated the Treaty of Monçon (1626), was created cardinal in the following year, and afterwards became Minister of State, a position which the jealousy of Richelieu soon made untenable for him. Bérulle freely bestowed his patronage on rising authors, and the publication of Lejay's *Bible Polyglotte* is ascribed to his influence. He was one of the first to appreciate Descartes. Bérulle's writings, several of which have been frequently republished, include the famous treatise entitled *Les grandeurs de Jésus.*

BERUNI, bā-rōō'nē, Abu Raihan Muhammed ibn Ahmed al (973-1048). An Arabian scholar and author. He passed a large part of his life at Ghazni, Afghanistan, during the time when that city was prominent as the capital of the Emperor Mahmud. His writings deal chiefly with the history, customs, and religions of India. One of these works appeared in English as *India* (London, 2 vols., 1888).

BERVIC, bâr'vêk', Charles Clément Balvay (1756-1822). A French engraver, born in Paris. In 1790 he won fame by his engraving of Louis XVI., from the picture by Callet, one of the finest works of the kind ever produced. The engravings of the "Laocoön," of Regnault's "Education of Achilles," and of Guido's "Rape of Deianira," display equal beauty of manipulation and higher power. His works are among the choicest of the French school.

BERWALD, bĕr'väld, JOHAN FREDERIK (1788-1861). A Swedish violin virtuoso and composer. He was born in Stockholm and was a pupil of the Abbé Vogler. He traveled as a juvenile prodigy and was famous in Russia, Poland, Austria, and Germany, before he was 10 years old. In 1819 he became conductor in Stockholm, and occupied this position until his death. Among his principal compositions may be mentioned: three polonaises for pianoforte and violin, op. 1 (1791); a symphony for the orchestra (1799); three quartets for stringed instruments (1808); and several songs.

BER'WICK, JAMES FITZ-JAMES, Duke of (1670-1734). A French marshal. He was the natural son of James II., by Arabella Churchill, sister of the Duke of Marlborough. He was born in France, where he was educated and entered the army. After serving in Hungary under Charles of Lorraine, he returned to England shortly before the Revolution of 1688, which he exerted himself to prevent. In 1689 he accompanied his father in his Irish expedition, and after the death of Saint Ruth had the nominal chief command. He next served in Flanders under Marshal Luxembourg, fighting at Steenkirk and Neerwinden, and afterwards under the Duke of Burgundy and Marshal Villeroi. In 1705 he put down a rising of the Camisards of Languedoc with great cruelty. In 1706 he was created a marshal of France and sent at the head of an army to Spain, where he established the throne of Philip V. by the decisive victory of Almanza. For this important service he was made a grandee of Spain. He fought all through the War of the Spanish Succession, and led an army against Philip V. in 1718. After several years of inactivity he received the command, in 1734, of an army intended to cross the Rhine. While besieging Philipsburg, he was killed by a cannon-ball. Berwick possessed some of the best qualities of a great commander. His defensive campaign in 1709, in Provence and Dauphiné, against the superior force of the Duke of Savoy, has always been regarded as a triumph of strategic skill. His *Mémoires* were published in Paris in 1778. Consult also Wilson, *Duke of Berwick, Marshal of France* (London, 1883).

BER'WICK, Miss MARY. The pen-name used in *Legends and Lyrics* (1858), by Miss Adelaide Anne Procter.

BER'WICKSHIRE. A maritime and border county in the southeast division of Scotland, bounded north by Haddington; south and southeast by Roxburgh, Northumberland, and Durham; east by the North Sea; and west by Mid-Lothian and Roxburgh (Map: Scotland, F 4). Area, 461 square miles. It is an agricultural county. Berwickshire is divided into three districts—the Merse, Lammermuir, and Lauderdale. The principal towns are Dunse; Greenlaw, the county-town; Lauder; Eyemouth, a prosperous fishing-station; Coldstream; Ayton; and Earlston, the Ercildoune of Thomas the Rhymer. Population, in 1801, 30,200; in 1851, 36,300; in 1891, 32,290; in 1901, 30,800.

BERWICK-UPON-TWEED, bĕr'ĭk- (shortened from *Aberwick*, from Celt. *aber*, confluence of waters + Teut. *wich*, Scand. *wick*, dwelling, village). A seaport town in Northumberland, England, at the mouth of the Tweed, 58 miles south-southeast of Edinburgh (Map: England, E 1). It is the frontier town of England and Scotland, and with its liberties comprising an area of about 8 miles, forms an independent borough and county, known since the Municipal Reform Act of 1835 as the "county of the borough and town of Berwick-upon-Tweed." For election purposes it is considered a part of Northumberland, and as such sends one member to Parliament. The town has an antiquated and somewhat picturesque appearance. It is girded with old fortifications and has large barracks. Among its notable public buildings are the town-hall, dating from 1760, with a spire 150 feet high, and the Corn Exchange, built in 1858. Tweedmouth and Spittal (the latter a favorite watering-place), on the south side of the Tweed, both within the municipality of Berwick, are reached by an old stone bridge and a magnificent viaduct of 28 arches spans the river. Its principal exports are agricultural produce, ale, wool, whisky, and fish, especially salmon. Its principal imports are timber, iron, staves, flax, tallow, oil, and hemp. Coal-mines are worked near the town. The town contains an iron-foundry, in which mill-machinery and steam-engines are manufactured. For the manufacture of agricultural implements, Berwick-upon-Tweed stands high, and in Spittal there are several large artificial-manure works. Population, in 1891, 13,377; in 1901, 13,437.

The history of Berwick-upon-Tweed is full of interest, especially in regard to the Border Wars. Its authentic records begin in the reign of Alexander I., in the Twelfth Century, when it was the principal seaport of Scotland. In 1296 Edward I. captured the town, and massacred 8000 of the inhabitants. It was retaken in 1297 by the Scots, but the English soon regained it and it remained in their hands throughout Edward's reign. It was captured by Bruce in 1318, but was reoccupied by Edward III. after a siege in 1333. For over a century it suffered occasional attacks from the Scots, who held it for brief intervals, but in 1482 it passed finally into the possession of England.

BER'YL (Lat. *beryllus*, *berullus*, Gk. βήρυλλος, *bēryllos*, probably from Skr. *vaiḍūrya*, originally brought from Vidura). A glucinum-aluminium silicate, which crystallizes in the hexagonal system. It has a vitreous lustre, and varies in color from an emerald green to lighter shades of that color, and into light blue, yellow, white, and sometimes rose-red. There are two distinct varieties of this mineral. The first is of a clear, bright, emerald-green color, which is due to the presence of a small amount of chromium, and is called emerald; this variety, however, must not be confounded with the Oriental emerald, which is a green variety of sapphire. The finest specimens are found in isolated crystals and in geodes with calcite, quartz, and other minerals. They come from New Granada, Brazil, and Siberia; and from Alexander County, N. C., in the United States. When cut they are highly prized as gems. Among the ancients the emerald was greatly esteemed as a prophylactic against epilepsy and a cure for dysentery. It was supposed to guard the chastity of the wearer, and to resent any trespass by breaking into pieces. The emerald-mines of Cleopatra are believed to have been in the mountain range that extends for a long distance parallel with the Red Sea and a few miles west of its coast, on the Nile. The transparent varieties of beryl are called *aquamarine.* They are found in various colors, and of a quality suitable for gems, in Brazil and Siberia, at Royalston, Mass., and at Stony Point, N. C. Large, coarse specimens of crystallized beryl, mostly hexagonal prisms, have been found at Acworth and Grafton, N. H. One specimen from Grafton weighed 2900 pounds.

BERYX, bĕr′ĭks. A genus of deep-sea fishes of tropical oceans, typical of a group Berycoidei and family Berycidæ. (See Slime-head.) One species, the 'Alphousine a costa cumprida' (*Beryx splendens*), is regarded as the most beautiful of Cuban fishes. It is deep red with bright streaks. See Plate of Mullets and Allies.

BERZE′LIUS, *Sw. pron.* bĕr-tsā′lĭ-ụs, Jöns Jakob, Baron (1779-1848). A Swedish chemist. He was born at Westerlösa, in Ostergötland. When a mere boy he developed a liking for the experimental sciences, and after receiving his general education at the Gymnasium of Linköping and his professional training in medicine and chemistry at the University of Upsala, he devoted himself specially to investigations in chemistry. In 1802 he went to Stockholm, teaching medicine and chemistry until 1806, when he was appointed lecturer on chemistry in the military academy. In 1807 he became professor of medicine and pharmacy in Stockholm. Shortly after, he was chosen member of the Stockholm Academy of Sciences, and from 1818 till his death held the office of perpetual secretary of the Academy. The King raised him to the rank of baron; other honors from learned societies were conferred on him; and the directors of the Swedish iron-works, in consideration of the value of his researches in their particular branch of industry, bestowed on him a pension for life. In 1838 he was made a member of the Upper Chamber of the Diet, after having served in the Lower; but he took little part in politics. The field of his activity lay in his laboratory, where he acquired a name of which his country is justly proud. The science of inorganic chemistry rests in a great measure upon the discoveries and views of Berzelius. His multiplied and accurate analyses established the laws of combination on an incontrovertible basis; and to him we owe the system of chemical symbols. He discovered the elements selenium, cerium, and thorium, and first exhibited several elements, including columbium, tantalum, and silicon in the isolated state. The blowpipe in the hands of Berzelius became a powerful instrument for the analysis of inorganic substances. By methods of his own invention he analyzed large classes of compounds and accurately determined the equivalent weights of their chemical elements. His celebrated electrochemical theory was for many years universally considered as explaining the true cause of chemical combination. It had been known since 1803 that, when an electric current is passed through the solution of a salt, the latter is decomposed and two substances are produced—a base and an acid; the former separating at the negative, the latter at the positive pole. This suggested the idea that chemical combination might be due to electrical attraction. In 1812 Berzelius consequently advanced a general theory of chemical combination based on the assumption that the atoms of the several elements, as well as certain groups of atoms, are charged with electricity, some being electro-positive, others electro-negative. To hydrogen was assigned a central position among the elements, since by combining with other elements it was capable of yielding both electro-negative and electro-positive substances; further, the extreme electro-positive position was assigned to the metal potassium, the extreme electro-negative position to the 'non-metal' oxygen. Different compounds formed by the combination of chemical elements were, according to this theory, capable of exercising further electrical attraction upon one another and therefore of combining into relatively complex substances. Thus, the electro-negative SO_3 (then called *sulphuric acid*) could combine with the electro-positive group K_2O (potassium oxide), to form the salt known as potassium sulphate. Similarly, the group SO_3 combined with the group MgO (magnesium oxide) to form magnesium sulphate. Again, potassium sulphate is more electro-positive than magnesium sulphate, since the metal potassium is more electro-positive than the metal magnesium; the two sulphates could, therefore, combine to form potassium-magnesium sulphate. This dualistic electrochemical theory was abandoned in the thirties. However, the theory of electrolytic dissociation, developed within recent years, may lead to a revival of Berzelius's views, though probably in a considerably modified form. (See Dissociation.) Berzelius's published works include: *Nova Analysis Aquarum Medeviensium* (Upsala, 1800); *Föreläsningar i djurkemien* (2 vols., Stockholm, 1806-08); *Öfversigt af djurkemiens framsteg* (Stockholm, 1812); *Afhandlingar i fysik, kemi och mineralogi* (6 vols., Stockholm, 1806-18); *Om blåsrörets användande i kemien och mineralogien* (Stockholm, 1820). His celebrated *Lärobok i kemien* was originally published at Stockholm in three volumes (1808-18); a second edition, in six volumes, was published between 1817 and 1830; the work has been translated into most of the European languages. The multitude and accuracy of Berzelius's researches in every branch of chemical inquiry make it difficult to conceive how one man could have accomplished so much. Consult: his 'Obituary,' in *American Journal of Science*, November, 1848; Louyet, *Notice sur la vie et les travaux de J. J. Berzelius* (Brussels, 1849); and Söderbaum, *Berzelius, Werden und Wachsen* (Leipzig, 1899).

BERZSÉNYI, bĕr-zhā′nyĭ, Daniel (1776-1836). A Hungarian poet, born at Hetye, County of Eisenburg. His *Versei* appeared in 1813, without his consent, under the editorship of Helmeczi. These poems, an authorized edition of which was published under the direction of the author in 1816, were cordially greeted, especially by the younger patriots, and have become classic in the literature of Hungary. The most recent edition is that by Toldy (2 vols., Pest, 1864).

BES. An Egyptian divinity, presiding over art, music, the dance, and childbirth, represented as a grotesque, deformed dwarf, and formerly identified with Typhon. He is of foreign origin, appearing chiefly after the Twentieth Dynasty, and is known to the Phœnicians.

BESANÇON, be-zäɴ′sôɴ′ (Low Lat. *Besantio*, Lat. *Vesontio*). The capital of the French Department of Doubs, and formerly of Franche-Comté, a fortress of the first class and seat of an archbishopric, situated on the river Doubs, 57 miles east of Dijon (Map: France, N 4). Besançon has many remarkable buildings and

Roman remains. The cathedral is a striking structure, dating from the Eleventh Century. The Prefecture belongs to the year 1697, and the palace of Cardinal Granvella, the minister of Charles V., is an interesting example of half Gothic, half Romanesque architecture. The gate of Mars, or Porte Noire, is a triumphal arch, built in A.D. 167, by Marcus Aurelius. There is also a Roman amphitheatre in ruins, whose vast proportions suggest the ancient importance of the city. Besançon was strongly but irregularly fortified by Vauban in the Seventeenth Century, the citadel being considered impregnable. Since that time the fortifications have been extended and strengthened. The present fortifications consist of the citadel of Vauban, with recent additions, which occupies the site of the ancient Roman stronghold, 1200 feet above sea-level. Forts are also built on the neighboring heights. The city is an important industrial centre, the principal productions being hardware, but there is great activity in the weaving of silk, linen, and cotton. One-fifth of the population is engaged in the manufacture of timepieces. Population, in 1896, 57,556. Vesontio, or Visontium, the capital of the Sequani, was a considerable place in the time of Cæsar, who in B.C. 58 expelled its inhabitants, and in the neighborhood of the city gained a victory over Ariovistus. It then became an important Roman military station. In modern times, after undergoing many changes, it finally came into possession of France in 1674. Consult *Besançon et la Franche-Comté; notices historiques* (Besançon, 1893).

BESANT′, or **BEZANT′**. A circular piece of bullion, generally gold, without any impression, supposed to represent the old coinage of Byzantium brought home by the Crusaders, and hence of frequent occurrence as heraldic charges. Besants are generally introduced into the arms of banks, and also into those of individuals who have been specially connected with money. Similar figures, when not colored *or* (gold), or *argent* (silver), are known in heraldry by the general term of *roundels*. A *bezanty cross* is a cross composed of besant and bezanty, or *bezantée*, is a term used when the shield, or any particular charge, is strewed with besants.

BESANT, bĕs′ant, Mrs. Annie (1847—). An English theosophist. She was born in London, October 1, 1847, began life as a devout Ritualist, married the Rev. Frank Besant, 1867, but soon afterwards became an avowed freethinker; was separated from her husband in 1873, and in 1874 joined the National Secular Society. Here she met Charles Bradlaugh, with whom she published a pamphlet, *The Fruits of Philosophy* (1877), which led to the arrest of the authors for alleged immorality, because they discussed plans for controlling the increase of population. After much litigation, they were acquitted. In 1889 she joined the Theosophical Society, and became an ardent disciple of Madame Blavatsky, and since then has devoted herself to the propaganda of theosophy throughout the world. With Herbert Burrows she compiled a *Petit glossaire de termes théosophiques* (Paris, 1894). In 1893 she made a lecturing tour in the United States, and published her autobiography under the title, *Through Storm to Peace*. Her later works include: *The Building of Kosmos* (1894); *The Self and its Sheaths* (1895); *Four Great Religions* (1897); *Dharma and the Story of the Great War* (1899); *Esoteric Christianity: or, the Lesser Mysteries* (1902).

BESANT, be-zänt′, Sir Walter (1836-1901). An English novelist and critic. He was born in Portsmouth, August 14, 1836, the son of William Besant. He was educated at King's College, London, and at Christ's College, Cambridge, and was appointed senior professor in the Royal College of Mauritius (1861-67). Returning to London on account of ill health, he formed a successful literary partnership with James Rice. They produced together many excellent novels, beginning with *Ready Money Mortiboy* (1872), and ending with *The Seamy Side* (1881). After the death of Rice (1882), Besant wrote a large number of novels, of which the most notable is *All Sorts and Conditions of Men* (1882), dealing with the social conditions in the East Side of London. This novel presented so clear a picture of the real life and limited opportunities of the common people of East London as to lead to the establishment of the People's Palace as a reality. The work gave an impetus to many other attempts at social reform, and assisted its author to an abiding-place among the social reformers of his generation. Among his other novels are *Dorothy Foster*, *Children of Gibeon*, *Armorel of Lyonesse*, *The City of Refuge*, and *The Orange Girl*. Besant also did an immense amount of miscellaneous writing. He founded the Society of Authors, becoming its first chairman (1884-85), and the editor (1890) of the *Author*, an official organ of the society. In 1895 he was knighted. He died at Hampstead, June 10, 1901. (See People's Palace.) Consult *Autobiography* (New York, 1902).

BESIDE′ THE BON′NIE BRI′AR BUSH. A collection of tales of Scotch life (1894), by Ian Maclaren, the pen-name of the Rev. John Watson, which excited wide interest, and made the author famous. The types of lowly life in these stories have been developed in other stories by the same author.

BES′IKA BAY. An inlet of the Ægean Sea, of marine strategic importance, on the northwest coast of Asia Minor, a little south of the entrance to the Dardanelles (Map: Turkey in Asia, B 3). The island of Tenedos lies at the mouth of the bay. The English fleet was stationed there during the crisis of the Russo-Turkish War in 1853-54, and again in 1877-78.

BESKOW, bĕs′kōv, Bernhard von (1796-1868). A Swedish poet and dramatist, born in Stockholm. He was appointed private secretary of the Crown Prince Oscar in 1825, and subsequently held several offices at Court. His more important works include the poems *Karl XII.* (1819) and *Sveriges anor*, and the tragedies *Erik den Fjortonde* (1827-28) and *Torkel Knutsson* (1830). He was a friend of Tegnér.

BESS, Good Queen. The rather indulgent name applied to Queen Elizabeth of England.

BES′SARA′BIA (after the family Bessaraba, which gave Waywodes to Wallachia). A government in the extreme southwest of Russia, bordering on Rumania on the west and south, and the Black Sea on the southeast (Map: Russia, C 5). It is bounded on the east by the Dniester, on the west by the Pruth, and on the south by the Danube. It covers an area of 17,600 square miles of mostly flat country, except for some well-wooded offshoots of the Carpathian Mountains in the northwest. It is intersected by several streams, which add to its fertility. The chief occupations are cattle-breeding and gardening, especially vine-growing, and the production of wine. Wheat, barley, and corn are raised to some extent, as well as tobacco, flax, and hemp. The manufactures of the province are insignificant; but its commerce, owing to its proximity to the frontier, is considerable, consisting largely of exports of cattle, wool, tallow, etc. The population, which is very heterogeneous, and composed of Russians, Poles, Rumans, Bulgarians, Jews, Armenians, Greeks, and Tatars, numbered 1,933,-500 people in 1897, scattered in 11 towns and 3560 villages. The capital is Kishinev. Bessarabia, which fell under the power of the Turks in 1503, suffered heavily in all the wars with Russia previous to the Nineteenth Century. It was ceded to Russia in 1812. By the Treaty of Paris of 1856, the portions of Bessarabia lying along the Pruth and the Danube, about 4000 square miles, were assigned to Moldavia, but at the Berlin Congress of 1878 the land was restored to Russia.

BESSA'RION, Johannes, or **BASIL'IUS** (1395-1472). A Greek scholar. He was born at Trebizond, on the Black Sea, 1395. He is remembered as one of the earliest of those scholars who, in the Fifteenth Century, transplanted Greek literature and philosophy into the West, and rescued the mind of Christendom from the trammels of scholasticism. Bessarion imbibed his love of Plato's writings from his tutor, Gemistus Pletho. He became a Basilian monk; in 1437 Archbishop of Nicæa, and in 1438 accompanied the Greek Emperor, John VII. Palæologus, to Italy, and effected, at the Council of Florence in 1439, a union between the Greek and Roman Churches, which, however, was of short duration. Soon afterwards he joined the Roman Church, but always retained a glowing love of his native land. He was made cardinal by Pope Eugenius IV. in 1439. Ten years after Nicholas V. created him Cardinal-Bishop of Sabina, and in the same year Bishop of Frascati. He was Papal legate at Bologna (1451-55). After the fall of Constantinople (1453), Bessarion visited Germany, and at the diets of Nuremberg, Worms, and Vienna endeavored to promote a crusade against the Turks. In 1463 he was made titular Patriarch of Constantinople by Pius II. In philosophy he professed to be a follower of Plato, but without depreciation of Aristotle. His writings consisted of Latin translations of Greek authors, etc. He died at Ravenna, November 19, 1472. Consult: *Inventaire des manuscrits grecs et latins donnés à Saint-Marc de Venise par le cardinal Bessarion en 1468* (Venice, 1894); and for his life, Henri Vast (Paris, 1878). His works are in Migne, *Pat. Gr.*, CLXI.

BES'SEL, Friedrich Wilhelm (1784-1846). An eminent German astronomer. He was born at Minden. Though destined by his father for a commercial life, he exhibited at a very early age an unconquerable fondness for astronomy. Though he yielded to his father's wishes and entered a mercantile house in Bremen, he worked continually at astronomy, and it was not long before it became evident that no career but that of an astronomer would suit him. His undivided attention once turned to science, he achieved speedy success. In 1810 he was director of the observatory at Königsberg and professor of astronomy. In 1818 he published his *Fundamenta Astronomiæ*, a work which marks an epoch in the progress of astronomy, and in 1830 his *Tabulæ Regiomontanæ*. His important contributions are too numerous to mention here. The most startling was perhaps his determination of the parallax of 61 Cygni. By this remarkable achievement, which was the first measurement of a star's distance from the solar system, Bessel inaugurated a new era in sidereal science.

It is not too much to say that Bessel was the father of modern observational astronomy, and there is scarcely a department of this science that was not improved or perfected by him; and in mathematical astronomy his work was almost equally important. Among other achievements, he was one of the first (1823) scientifically to consider the personal equation of observers.

BESSELS, bĕs'sels, Emil (1847-88). A German scientist. He was born at Heidelberg, and studied at the universities of Jena and Heidelberg. In 1869 he made his first Polar journey, in the course of which he demonstrated the existence of the Gulf Stream to the east of Spitzbergen. In 1871 he accompanied the expedition under C. F. Hall (q.v.), as ship's physician and chief of the scientific department. His collections were lost in the wreck of the *Polaris*. He published: *Scientific Results of the United States Arctic Expedition* (1876) and *Die amerikanische Nordpolexpedition* (1878).

BES'SEMER. A city in Jefferson County, Ala., 11 miles southwest of Birmingham, on the Louisville and Nashville, the Southern, and other railroads (Map, Alabama, C 2). Iron and coal mines are in the vicinity, and the city is noted for the number and variety of its works devoted to the production of iron and steel in various forms. The manufacture of fire-brick is another important industry. Bessemer is governed by a mayor, holding office for two years, and a city council, elected on a general ticket. Population, in 1890, 4544; in 1900, 6358.

BESSEMER. A city and county-seat of Gogebic County, Mich., 47 miles east of Ashland, Wis., on the Duluth, South Shore and Atlantic, the Wisconsin Central, and the Chicago and Northwestern railroads (Map: Michigan, C 2). It has a picturesque location, and contains a fine high school, city hall, and brown-stone court-house buildings. The city is the centre of the productive Gogebic iron range, and is engaged principally in iron mining and manufacturing. Population, in 1890, 2566; in 1900, 3911.

BESSEMER, Sir Henry (1813-98). An English inventor, who originated and successfully developed the process for making steel known by his name. He was born at Charlton, near Hitchin, England, and acquired his early education in the schools of the neighborhood. His father, who was a French artist, owned a type-foundry, and in this establishment the son received his early mechanical training. He inherited from his father artistic talent, and was skillful at modeling, designing, and painting. He early turned his attention to mechanical inventions, and his first successful scheme was a method of impressing on deeds and other documents the stamps of the internal revenue office, which at that time could be forged readily. Of such marked excellence was this invention that it was straightway appropriated by the revenue office, without compensation to the inventor, in spite of his strenuous efforts to secure justice. Later in life, when he had achieved success and honor, he brought this matter to the attention of the Government, and was knighted (1879) as a tardy recognition of the value of his early invention. Bessemer's next work of importance was that of a new method of producing bronze powder, or 'gold' paint, which was successful from a commercial point of view, and supplied him with resources to carry on his metallurgical researches. He was greatly interested in the production and manipulation of alloys, doubtless on account of his father's business as a type-founder, and though without a scientific training, he was a careful, ingenious, and determined investigator. During the Crimean War, in common with many other inventors, he was engaged in experiments looking to the improvement of cannon, and designed an elongated projectile so shaped and perforated as to revolve in its flight through the passage of air and powder-gases. For the discharge of such a projectile he found that the cannon of that period would not resist the strain, and accordingly he determined to carry on experiments with a view to producing iron of greater strength. Working in Paris, with the encouragement of the Emperor Napoleon, he produced an improved form of cast iron, and was then led to further refine the iron until steel was produced. Patents were taken out in connection with these ideas in 1855, and the experiments were continued, so that Bessemer soon (in his own words) "became convinced that if air could be brought in contact with a sufficiently extensive surface of molten crude iron, the latter would rapidly be converted into malleable iron." As a result of numerous experiments followed the 'converter' (q.v.), which, along with the other apparatus, was installed in 1856 at his bronze-factory in London, and steel ingots were produced which were successfully rolled into rails without hammering. After the process was developed, the Bessemer Steel Works in Sheffield were erected, and were soon producing a large output, as well as training competent workmen to carry on similar factories in other parts of the world. On August 13, 1856, Bessemer read a paper at the Cheltenham meeting of the British Association, on "The Manufacture of Malleable Iron and Steel Without Fuel," and in 1865, at the Birmingham meeting, he read another important paper "On the Manufacture of Cast Steel, its Progress and Employment as a Substitute for Wrought Iron." The growth of this process (see IRON AND STEEL, METALLURGY OF) was not only marked in itself, but it had a wide-spread effect in greatly cheapening the price of steel and making it available for railway and other engineering work. In 1858 the steel made at Sheffield, the principal producing centre of England, was less than 50,000 tons, produced by the cementation process. Since that time the output has marvelously increased, and in 1896 Great Britain produced 1,815,842 tons of Bessemer-steel ingots and the United States 3,019,906, the yearly output of the world being considerably in excess of 10,000,000 tons. Bessemer's process has in forty years undergone few, if any, radical improvements.

In addition to his success in steel-working, which brought him renown and fortune, Bessemer had other inventions to his credit, among which were a method for compressing into a solid block the graphite used in the manufacture of lead-pencils, which is still in use: a method for casting type, using a force-pump to drive the metal into the mould; a system of rollers for embossing and printing paper; a machine for embossing velvet; and a ship with a stationary cabin. The latter, on which Bessemer spent much money, was, however, a complete failure. In 1859 Bessemer received his first honor, in the form of the Telford Medal of the Institute of Civil Engineers; in 1872 the Albert Medal of the Society of Arts; in 1871-73 he was president of the Iron and Steel Institute of Great Britain; and in 1879 he was made a fellow of the Royal Society. That a man who did so much for British industrial development did not receive higher honors from the home Government was a source of deep regret to English engineers, who alluded to the fact that, in the United States, where the Bessemer process was largely used, eight cities or towns bore his name. He was an honorary member of many foreign engineering and scientific societies, including the American Society of Mechanical Engineers, before whom, in December, 1896, he presented a paper on "The Origin of the Bessemer Process," which was printed in the *Transactions* of that society (Vol. XVII., New York, 1896), and also published in *Engineering News* (Vol. XXXVI., New York); *Engineering* (Vol. LXII., London), and other scientific journals of that time, to which the reader is referred.

BESSEMER-STEEL PROCESS. See IRON AND STEEL, METALLURGY OF.

BESSENYEI, bĕ'shĕn-yĕ-ĭ, GYÖRGY (c.1742-1811). An Hungarian dramatist. He was born at Berczel, county of Szabolcs. After a brief and fragmentary course of study, he led an idle life until 1765, when he was chosen, with other young nobles, to form Maria Theresa's Hungarian body-guard at Vienna. In the brilliant and cultured world into which he was thus suddenly introduced, Bessenyei soon realized his own deficiencies, and applied himself day and night to studies. With the knowledge of other languages and literature came also the realization that his race had been surpassed by other nations, both in culture and refinement. Spurred by this thought, he soon formed within the royal body-guard a literary circle which was rooted in French classicism and bore the seeds of the modern Hungarian renaissance. Bessenyei himself was surprisingly prolific and versatile. His earliest work was a tragedy, *Agis*, drawn from Spartan history. Other tragedies followed, based upon Magyar traditions; then came comedies, modeled upon Molière; an epic, *King Matthias;* and a series of prose works in the field of history and philosophy, including a *Life of John Hunyadi*, and a *Philosophic History of Hungary.* Until 1791 Bessenyei lived in Vienna, where he had charge of the Court library. After that year he retired to his small country-seat, where he lived quietly, paying small heed to the development of literary tendencies which he himself had set in motion, yet not wholly ceasing from his labors until his death, in 1811.

BESSEY, bĕs′sĭ. Charles Edwin (1845—). An American botanist, born at Milton, Ohio. He graduated in 1869 at the Michigan Agricultural College, studied at Harvard under Prof. Asa Gray, in 1872, and 1875-76, and was professor of botany at the Iowa Agricultural College from 1870 to 1884. In 1884 he was appointed professor of botany at the University of Nebraska. He is the botanical editor of *Science*, and has published *The Geography of Iowa* (1876), and two excellent text-books, *Botany for High Schools and Colleges* (1880) and *The Essentials of Botany* (1884).

BESSIÈRES, bâ′syâr′, Jean Baptiste (1768-1813). Duke of Istria and Marshal of the French Empire. He was born at Preissac, in the Department of Lot, and after serving for a short time in the 'Constitutional Guard' of Louis XVI., entered the Army of the Pyrenees as a private soldier in November, 1792. In less than two years he had attained the rank of captain, and, passing into the Army of Italy, he distinguished himself greatly in the battles of Roveredo and Rivoli. He was made chief of a brigade in 1798, and in that year accompanied Bonaparte to Egypt, and gained distinction at the siege of Saint Jean d'Acre, and at the battle of Abukir. Afterwards he took a prominent part in the greatest battles of Napoleon—Marengo, Austerlitz, Jena, Friedland, Eylau, Eckmühl, Aspern, and Wagram—and within five years (from 1800 to 1805), he was made successively general of brigade, general of division, and marshal of France. For his gallant behavior in Spain he was in 1809 created Duke of Istria. In the Russian campaign he commanded the cavalry of the Guard, and during the disastrous retreat from Moscow the services he rendered were of the utmost importance. In 1813 he received the command of the whole of the French cavalry. On the morning of the battle of Lützen, while leading on foot the tirailleurs to reconnoiter the field from the defile of Rippach, he fell mortally wounded. The news of his death was kept concealed from the army throughout the day. Bonaparte lost in Bessières one of his ablest officers and his most faithful friend. Bessières was a kind commander and an honest man. He died poor.

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